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IMPACT OF WTO NEGOTIATIONS ON AGRICULTURE IN PAKISTAN AND IMPLICATIONS FOR POLICY

By
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SURELY, successful are those who are trustworthy: Those who fulfill their covenants when they covenant and those who honour their commitments

"Multilateral trade arrangements finalized under the World Trade Organization (WTO) have brightened the prospects for Pakistan in the export of most major agricultural commodities. Pakistan has considerable potential in export of leather and leather made-ups, spices, flowers, plants and tropical nuts and fruits where developed countries have promised to reduce tariffs by some 40-50 per cent. However, being a net importer of staple foods, Pakistan is likely to face rising food import prices as a result of reduction in agricultural support and export subsidies. The benefits would accrue only if (a) WTO negotiations are fully implemented by all the countries in letter and spirit; (b) sanitary and phytosanitary measures, anti-dumping and labour laws, environmental protection and quality standards are not misused to restrict trade; and (c) benefits from technological breakthroughs are not restricted to the developed world.

For extracting benefits from the arrangements, the developing countries need to lobby for their collective cause, stress the implementation of the Act and to strengthen regional trade associations, such as SAARC and ECO. Moreover, to achieve rapid growth in agricultural output and to augment exportable surpluses, it seems necessary to raise commodity prices to their long term world levels. The emphasis needs to be shifted to improving efficiency of input delivery systems, investing in market infrastructure for exports, and to undertaking steps to ensure quality exports in terms of purity of product, environmental considerations and labour standards."

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1. Introduction

Trade liberalization has been the dream of the world economy since the appearance of Adam Smith's writings. However, organized efforts in this direction began to appear only since the First Round (in 1948) of trade negotiations under the General Agreement on Tariffs and Trade (GATT) after World War II [Diaz-Bonilla and Robinson (1998)]. Although, participation by the developing countries in GATT rounds was sparse and their effect not wide spread, but these rounds had been quite instrumental in motivating many developing countries to appreciate the virtues of trade liberalization. As a result, as many as, 123 world economies took an active part in the Uruguay Round completed in 1993. In the subsequent rounds of newly created World Trade Organization (WTO), the multilateral trade agreement has been considerably expanded and made more comprehensive. In its final form it covers a wide variety of issues including trade in agriculture, prices of main agricultural commodities and key agricultural inputs.

While the present paper is mainly centered on implications of WTO rounds for Pakistan's agriculture, it gives a brief review of the agricultural negotiations in section 2. Section 3 highlights the impact of these negotiations on the production of various traded commodities of Pakistan under static as well as dynamic conditions. The section also points to some of the practical limitations threatening the smooth working of the agreement. In section 4, Pakistan's policy responses to changing world situation are pointed out. The final section 5 presents a summary of paper's findings.

2. A Review of Agricultural Negotiations

The final agreement on agriculture covers products that are associated with basic necessities of life and would be implemented in stages that extend over a grace period of six years for the developing countries and ten years for developed countries beginning with 1995. It comprises of four major components; namely, open market access, reduction in Aggregate Measure of Support (AMS) and export subsidies, provision of sanitary and phytosanitary measures and concessions for least developed and food importing countries. In addition, the Agreement on Textiles and Clothings

(ATC) has special significance for Pakistan's agriculture. The greater market access contains three elements: tariffication, tariff reduction and access opportunities. Tariffication implies replacement of non-tariff trade barriers, like quotas, liscencing, debarring imports and exports etc., by equivalent tariff imposition. The existing tariff rates are to be reduced by an average of 36 percent in the developed countries and by 24 percent in the developing countries. Access opportunities involve imposition of duties when there are either import surges or particularly low prices (FAO (1995)].

Under the agreement, domestic support policies for agriculture must ensure a reduction of 20 per cent in the developed and 13.3 per cent in the developing countries in the total Aggregate Measure of Support. Policies that entail less than 5 per cent of value added by agriculture in developed countries and 10 per cent in developing countries or those having no effect on production or trade are exempt. Untargeted subsidies on food distribution among the poor and investment and input subsidies available to poor farmers in the developing countries are also exempted from the purview of the agreement. Export subsidies on individual commodities should be reduced by 21 per cent and expenditure on them by 36 per cent in the developed countries and correspondingly 14 and 24 per cent in the developing countries. In view of the anticipated increase in world food prices, the agreement also provides for food aid in grant form, technical assistance to raise agricultural productivity, export credit and credit guarantees for the least developed and food importing countries [FAO (1995)].

The application of sanitary and phytosanitary measures include the enforcement of laws that protect human, animal or plant life and health based on scientific evidence. Although still debatable environmental considerations, use of child labour in production process and ensuing pollution as a result of economic activity have increasingly been drawn into various WTO Rounds which have far reaching implications for inhibiting free access of developing countries to markets in the developed world.

Finally, the Agreement on Textiles and Clothings (ATC) provides for the integration of the Multi-fibre Arrangement (MFA) with the WTO system and its gradual conformity with trade liberalization rules.

3. Implications of the Act for Pakistan

While the above description of agricultural negotiations under WTO deals directly with agriculture, they may be sharply inadequate for an indepth study of WTO rounds on Pakistan's agriculture. This would especially be true as some of the elements of the agreement like currency exchange reforms, anti-dumping laws, Trade Related Intellectual Property Rights (TRIPs), product standardization (ISO 9000 certification) and labour standards may have far reaching effects on agricultural output and commodity trade relative to direct negotiations. It should, therefore, be noted that the impact assessment that follows is based on negotiations that have both a direct and indirect relevance.

There is no dearth of economic literature on the positive contributions of free trade to enhancing production efficiency and world output. These are embedded in the concept of comparative advantage which determines the movement of goods and services from relatively more efficient production systems to less efficient ones. To the extent that WTO negotiations are a first step towards free trade, they would ultimately, through successive rounds, lead to the achievement of greater output efficiency and result in positive impact on agricultural production. In fact, the empirical evidence cited in most of the studies on the subject gives unconditional support to the above conclusion and at least one study [ABARE (2000)] has estimated a global gain in gross domestic product of US$ 53 billion in year 2010 following a 50 per cent reduction in agricultural support levels relative to the case of no change in policies. There is also evidence in some of the studies which predicts a somewhat slower growth of world agricultural output and staggering commodity stocks as an immediate aftermath of reduced protection to agriculture under WTO negotiations [Hertel (1990) and FAO (1995)]. It may, however, be noted that the effects of WTO negotiations would vary from country to country depending on tariff reductions, trade and protection patterns, competitive market structures and the mix of internal policies [Blackhurst, Enders and Francois (1995)].

As far as Pakistan is concerned, considerable expansion in agricultural output and trade may be anticipated with a full and uniform implementation of WTO negotiations by all the developed and developing

world economies. For example, an FAO study [FAO (1997)] has shown empirically that Pakistan was likely to benefit more than any developing country under full reform conditions. The study estimated that the growth rate of wheat production was likely to be five percentage points higher under the UR scenario amidst above average annual increases of other crops. It was also shown that this increase was synonymous with yield increase without significant change in area harvested and was attributable to favourable trends in commodity (especially wheat) prices as a result of withdrawal of negative rates of protection to agriculture. Another study [Ingco and Winters (1996)] also predicted that the Round has been very positive for Pakistan. The study on the basis of static analysis came up with estimated annual gains of US$ 0.54 billion in 1992 to 1.23 billion in 2004. Once allowance is made for induced investment effects, they rise to US$ 1.23 billion and 2.64 billion respectively. These gains could result from a number of factors like reform of the Multi-Fiber Agreements, enhanced technological and other transfers, improved market access and a more transparent and egalitarian trade environment [Goldin and Mensbrugghe (1995)]. To the extent that the act is likely to have varied effects on exportables and importables, it seems pertinent to organize our discussion accordingly.

3.1 Prospects for rising exports

Pakistan is a major exporter of primary commodities and its exports, in order of their importance, comprised of cotton, textiles and products (65.9 percent), leather and made-ups (6.7 percent), rice (6.5 percent), sports goods (4.4 percent) and others (16.5 percent) during 1997-98. It must be noted that the performance of Pakistan's export sector in the past has been quite satisfactory despite all kinds of trade restrictions by the developed countries [Pakistan (1999)]. It can, therefore, be inferred that Pakistan's export prospects would be considerably brightened if and when the trade barriers would be removed under WTO negotiations.

To put things in perspective, the tariff rate reductions in the developed countries, as a first step, should raise prices of Pakistan's exports in the international market and motivate Pakistan to pursue export promotion strategies and policies. Secondly, the tariffication of quantitative restrictions should lead to improvement of market access for Pakistan's exports

especially in the case of exports of cotton, textile and clothing and leather and made-ups with the phasing out of Multi-fiber Agreement (MFA) [Khan and Mahmood (1996)]. According to the MFA, textile and garment exports of the developing countries are subject to quota restrictions by the quota countries thwarting and denying free access to and competition in the international market. The high use of allotted quota to Pakistan indicates that the complete phasing out of the MFA should enlarge its export share in world trade of cotton, textile and garments [Khan and Mahmood (1996)]. Thirdly, the agricultural producers of the developing countries in general and of Pakistan in particular had been competing with heavily subsidized exports from the industrial countries particularly from the United States and the European Union [Blackhurst, Enders and Francois (1995)]. An increase in Pakistan's exports can, therefore, be expected, as a result of the reduced Aggregate Measure of Support (AMS) in most of the developed countries of the west. Finally, it can be expected that Pakistan would have to face intense competition from developed and many developing countries for a larger share of world exports. However, Pakistan need not worry about it as it has a strong comparative advantage and fairly competitive power in agricultural production especially in the case of exportables as is shown by the data in Table-1.

Table-1: Domestic Resource Cost, Support Prices and Parity Prices for Pakistan of Major Agricultural Commodities

Commodities	Domestic Resource Cost	Commodity Prices (Rs per tonne) during 1997-98	
		Support price	Parity price
Cotton	0.25	14,375	21,955
Rice (basmati)	0.56	7,750	8,768
Rice (IRRI)	0.92	3,825	3,667
Sugarcane	1.35	875	1,089
Wheat	0.82	6,000	9,774

Source: [Chaudhry (1999), Chaudhry and Sahibzada (1994)].

It is clear from Table-1 that Pakistan has an overwhelming comparative advantage in the production of cotton followed by that of basmati rice. The same applies to the production of wheat and IRRI rice but

only marginally. There is total absence of comparative advantage in the production of sugarcane. Thus, Pakistan has an exclusive advantage over other countries in the efficient production of cotton and basmati rice and can freely trade in the world markets without any fear of competition. Pakistan's prices of agricultural commodities are way below world prices which bestow it an edge in competitive power and enough room for added price incentives for greater agricultural output. Although IRRI rice continues to be Pakistan's traditional export, its prospects as an export crop seem to be somewhat dim after full implementation of Uruguay Round. This is so because Pakistan can no longer afford export subsidies and face competition from East and South-East Asia. Studies have also shown that Pakistan has considerable potential to benefit from exports of leather and leather made-ups, spices, cut flowers, plants and tropical nuts and fruits where developed countries have promised to reduce tariffs by some 40-50 percent [Khan and Mahmood (1996)].

3.2 Import situation and trends

Unlike heavy concentration of exports on cotton, textiles and garments, Pakistan's imports involve a wide variety of goods. During 1997-98 Pakistan's total import bill exceeded Rs. 436 billion. Of the total import bill, roughly 19 percent was earmarked for food group, 24 percent for machinery, 16 percent for petroleum and petroleum products and 24 percent for textile, metal and miscellaneous other categories of imports. Being net importer of staple foods such as wheat, edible oils, dairy products and pulses, Pakistan is likely to face rising food import bills. It was a common perception among the Uruguay Round participants that food prices were likely to rise and world's buffer stocks were likely to fall as an aftermath of agricultural reform progamme which involved reduced AMS and food export subsidies [Goldin and Mensbrugghe (1995)]. However, the rise in food prices might induce Pakistan to pursue more aggressive policies of meeting staple food requirements from domestic sources for elimination of wheat imports. In fact, studies have indicated that Pakistan was most likely to emerge as a significant food exporting country if the price signals ensuing from agricultural trade liberalization were transmitted to domestic consumers and producers [Anderson and Tyers (1990), FAO (1999) and Hertel (1990)]. It would be encouraging to note that Pakistan has already produced a large surplus of wheat estimated around one million tonnes during 1999-00 in

response to improved situation of procurement prices of the commodity. Furthermore, Pakistan was also unlikely to face adverse effects of higher food import bills as it was also recognized as a net food importing country and was entitled to provision of food aid in grant form and assistance for agricultural development. Thus, although the consumers have to pay higher food prices, the Uruguay Round may not necessarily impose higher food import costs on Pakistan's economy.

3.3 Limitations of the act

The above analysis is based on the assumption that the Uruguay Round and subsequent WTO negotiations will be fully implemented by all the countries in letter and spirit. As the assumption may not hold, limitations of the above analysis should be obvious. An explicit statement of some of these limitations is as under:

Firstly, in anticipation of the benefits of the Uruguay Round, Pakistan like many other developing countries has significantly reduced distortionary domestic agricultural policies by drastically reducing the tariff rates and eliminating restrictions on foreign trade [Naqvi and Mahmood (1995)]. By contrast, the developed countries especially the United States and European Union have used delaying tactics to implement MFA, have been hesitant to eliminate producer and export subsidies and have adopted safeguard measures for continued protection of domestic industry. The net result of these reservations on the part of industrial countries has been thwarting of the benefits which were to accrue to the developing countries and the world at large.

Secondly, although the Uruguay agreement and subsequent WTO negotiations are aimed at elimination of traditional trade barriers such as tariffs, quotas and trade preferences, the erection of new trade barriers has increasingly been practiced by the developed countries to limit exports from the developing countries. Sanitary and phytosanitory measures, anti-dumping laws, labour standards, environment protection and ISO 9000 form the crux of some of these new barriers which have been or are likely to be used to restrict free trade. It has, for example, been pointed out that Pakistani textile products have been subjected to anti-dumping investigations by Brazil, EU,

Japan, Mexico, South Africa and Turkey [Khan and Mahmood (1995)]. Similarly, countervailing duty investigations have been conducted by Australia, Chile and U.S. Although these investigations found no evidence, a countervailing action by the U.S. and anti-dumping measures by South Africa (on printed bedlinen) followed and were still in force in 1996 [Khan and Mahmood (1996)]. The unsatisfactory disposal of chrome waste in leather industry and use of child labour in carpet manufacturing in Pakistan have been used by many countries as an excuse for restricting import of leather products and carpets from Pakistan. The sanitary and phytosanitory measures are most likely to set quality standards for exportable commodities especially for food. As most developing countries including Pakistan, are ill-equipped to meet the food standards established by the Act, they remain an unlikely beneficiary of food and agricultural exports. Although the spirit of Uruguay Round is against restrictive trade policies and preferential treatments, the world has increasingly moved into trading blocs. Thus, the dream of free trade on a worldwide scale remains unmet at best.

Finally, the genetically modified agricultural products and ensuing technological breakthroughs offer a special challenge. It has been pointed out that the public may block the development of important new technologies to feed the world in coming decades if the policy makers do not handle the issues surrounding genetically altered food sensitivity, particularly through rigorous analysis of the risks to human health and biodiversity [Diaz-Bonilla and Robinson (1998)]. Being the beneficiary of research, development and technological breakthroughs abroad, Pakistan and developing countries would be particularly vulnerable to lack of research in this area. The same would apply if the research findings of the industrial countries are patented under the Trade Related Intellectual Property Rights (TRIPR).

4. Policy Options for Pakistan

It should be clear from above that the effect of WTO negotiations on agricultural development in any developing country would depend on external environment and domestic policies in vogue. As the external conditions are beyond the powers of any of the developing countries, Pakistan can not change it in its favour. However, it can join hands with other developing countries to lobby for extracting maximum possible

benefits from the arrangements. For example, developing countries as a group can point to slower progress of implementation of Uruguay Round in the industrial countries and should insist on immediate elimination of export subsidies, trade-distorting payments to farm sector and quota restrictions. The developing and least developed countries, as a joint venture, should pressurize the developed countries to comply with tariffication, tariff reduction, de-escalation of tariffs on non-agricultural products and demand financial and grant assistance for agricultural development and food imports respectively. In order to reap full benefits of rising international prices of agricultural commodities, Pakistan independently and in collaboration with other developing countries of the region should strive to strengthen such regional trade associations as SAARC and ECO. The strengthening of these associations is most likely to increase the bargaining power of the member countries as well as integrate them in the world economy [Khan and Mahmood (1996)].

On the domestic front, many policy options can be exercised to maximize the gains from changes contemplated in the agreement. These policy changes can be listed as follows.

Although the maximization of benefits of Uruguay Round is preconditioned by transmission of world prices to consumers and producers, Pakistan continues to maintain prices of major agricultural commodities at considerably lower than world levels. In order to revive incentives, investment, and rapid growth of agricultural output and to plan for food self-sufficiency and exportable surpluses, it seems absolutely necessary to raise agricultural commodity prices to world levels in accordance with the trend lines or five-year moving averages of corresponding import and export parity prices.

Secondly, the government intervention in agricultural commodity markets is against the spirit of trade liberalization and must be replaced by creation of regulated private marketing system. In order to ensure fair play and competition in these markets, the activities of the market functionaries should be closely supervised and monitored by market committees with membership from producers, commodity dealers and local and provincial government officials.

Thirdly, at par with reform of commodity markets, the efficiency of input delivery systems should also be improved. Black marketing, under bagging and sale of substandard fertilizers, pesticides and seeds need to be eradicated through strict punitive actions, open market sales and breaking up of input monopolies of registered dealers, industrialists and the government.

Fourthly, for an effective entry into the export market, Pakistan needs to concentrate on commodities with high comparative advantage and invest heavily in storage, packaging, grading, procurement and delivery system technologies. The investment in infrastructural facilities would be particularly important as Pakistan would be in dire need of diversification of its exports in favour of spices, tropical fruits, nuts, vegetables, plants and cut flowers. It must be noted that the export of fruits, vegetables and cut flowers would need investment in a fool-proof system of refrigerated storage and transport.

Fifthly, Pakistan would be well-advised to curtail illicit trade practices and ensure quality of its exports in terms of purity of the product, environmental considerations and labour standards. While Pakistan has made some progress in this respect, a lot more needs to be done for satisfactory compliance of WTO's emerging requirements.

Finally, the benefits of trade reforms accruing to Pakistan are heavily dependent on how the developed countries respond to reform measures especially in terms of opening up of their markets to developing countries, reduction of subsidies and support to agriculture, withdrawal of export subsidies and removal of quantitative restrictions, tariffs and taxes on imports from developing countries. As such, Pakistan can not force the developed countries to honour their commitments but it should not give up on claiming its rights and reminding the developed countries of ignoring the WTO agreement until the full implementation. It seems to be more appropriate to pursue the goal jointly with other developing countries facing similar situations.

5. Summary and Conclusions

The main conclusion of the paper followed in the foot steps of general literature demonstrated positive impact of the agreement on world's agricultural production and trade. Given the nature of its trade and internal policies, beneficial effects of the agreement seem to be more pronounced in the case of Pakistan. The above conclusion, however, follows from universal implementation of the WTO agreement. To the extent that the assumption may not hold, the flow of benefits to Pakistan become a bit shaky especially as the industrial countries have resorted to erect new trade barriers on top of the incomplete and hesitant elimination of the existing ones. Although no individual country can force the industrial world to comply with WTO agreements, some combined efforts of the developing countries might be useful for their enhanced welfare as well as the welfare of individual countries.

Given its comparative advantage, in the production of major agricultural commodities, the reform programme under WTO can help Pakistan to raise agricultural production substantially. To consolidate the benefits, Pakistan should ensure world level agricultural commodity prices, replace government intervention with regulated private marketing system, improve efficiency of input delivery systems including irrigation water, invest in market infrastructure for exports and undertake steps to ensure quality exports in terms of purity of product, environmental considerations and labour standards.

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NOT EVEN A QUARTER OF AN ONION A DAY!

By
Syed Shahid Husain*

Fed up eating "*Manna-o-Salva*" , they yearned to have what the Earth grows: Of its vegetables, its cucumbers, its cereals, its lentils and its onions

"Onion (Allium Cepa) constitutes an important kitchen item of daily use. It belongs to family of Liliaceae which also includes asparagus, leeks, scallion, garlic, chive, and shallot. It is free of fats and cholesterol and contains generous amount of vitamins and chemicals which help fight the free radicals in human body. Onions increase blood circulation, lower blood pressure, prevent blood clotting and help increase the good type cholesterol (HDL). Onions need to be taken both in cooked and raw form in daily diet. However, the availability of onions in Pakistan is not even a quarter of an onion a day per capita. Thus, there is a need to increase their production and hence availability. In addition to enhancing productivity through the supply of certified seed, encouraging nursery raising in Balochistan, educating the growers to improve plant population, using proper fertilizer mix and controlling of pests, diseases and weeds; marketing of onions also needs to be improved. Minimum guaranteed price and adequate returns to the onion growers need to be ensured. However, to minimize loss in onion procurement operations, construction of adequate cold storage capacity, locating new export markets and adopting proper trade policy seem to be essential. This paper points out such production and marketing constraints and suggests some remedial measures".

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1. Introduction

Onion (*Allium Cepa)* is the most important bulb vegetable. It belongs to family *liliaceae*, most members of which have an underground storage system, such as bulb or tuber. The other members include such ornamental plants as the tulip and hyacinth and edible plants like asparagus, leeks, scallion, garlic, chive and shallot. Onion is among the world's oldest cultivated plants. It originated in Iran and Pakistan (of today) and spread to Ancient Egypt, Greece and Rome. In Rome it became known as UNIO, meaning large pearl. It was brought to North America by Spaniards and the Romans introduced it to Britain where it became UNYON and later on ONION. Onions were probably known in India, China and the Middle East before recorded history. Onion ceased to be an unimportant crop in Europe after French Onion Soup was made popular by Stanislaus I, the former King of Poland.

One raw onion having 100 gms of edible substance provides 49 calories of energy, 1.4 gms of protein, 32 mgs of calcium, 20 I.Us of Vitamin A, 12 mgs of ascorbic acid, 0.03 mg of thiamine, 0.12 mg of riboflavin and 0.1 mg of niacin. Onions are high in water contents with no fats and no cholesterol. Onions contain chemicals which help fight the free radicals in our bodies. Free radicals cause disease and destructions to cells which are linked to at least 60 diseases. To make onions milder, they should be soaked in milk or poured in boiling water and rinsed with cold water. When a person eats at least half a raw onion a day, the good type HDL cholesterol goes up an average of 30%. Onions increase circulation, lower blood pressure, and prevent blood clotting.

In Pakistan and most of Asia, onion constitutes an important component of human diet and is eaten cooked, pickled or raw. A traditional practice in the subcontinent is to use it with vinegar during times of cholera and is believed to help control the infections in intestines and protect from toxins produced during infections. Wild onion grown in the mountains at high altitude is used as a stimulant where headache and nausea develop due to low oxygen concentration. It helps stimulate blood circulation and oxygen absorption by blood. The onion's characteristic pungency results from the

sulphur rich volatile oil it contains. Release of this during peeling brings tears to the eyes. This can be avoided by peeling onions under running water.

Onions also possess some medicinal value as well. Curative powers have been attributed to onions throughout the centuries. Its flavour component has antimicrobial activity/value and is essential in many of our cooked food. It has been recommended for such varied ailments as colds, earaches, laryngitis, animal bites, powder burns and warts. Crushed onion is used to remove thorns from flesh. Cut onion is also used as a lizard repellant in houses.

2. Soil and Climatic Conditions

One of the distinct characteristics of onion crop is that it can be grown on nearly all types of soils from sandy loams to heavy clays. Addition of organic matter such as manure and other composted or decayed material loosens the soil and increases aeration, drainage, nutrient availability and water holding capacity. Onions grow best in loose, well drained soil of high fertility with plenty of organic matter. However, heavier clay soils need to be modified with organic matter to improve aeration and drainage.

The onion is adopted to wide range of environment and is tolerant to frost. Generally the temperature between 20^0 and 25^0C is considered suitable for nursery, 12^0 to 21^0C at transplanting stage, 16^0 to 25^0C at bulbing stage and 30^0C at maturity. Bulbing starts with rise in temperature and day length and not by age. The bulbing photoperiod differs with variety. Varieties having long day requirements are cultivated in Balochistan while those needing short day photoperiod are grown in other three provinces. Warm and dry weather results in serious attacks from thrips. Onion smut is more prevalent at temperature below 27^0C and almost absent above 30^0C. Downy mildew thrives under moderate temperature and high humidity.

3. Cultivation Practices

3.1 Sowing

Onions are normally grown either directly from seed or by transplanting seedlings raised in nursery or from small bulbs. All the three methods of planting are used in Pakistan in growing commercial onion crop. In Balochistan, onions are raised by direct seeding. In this method, the seed rate is high and on an average 6 kgs of seed per acre is used. Moreover, crop stand becomes irregular causing weeding difficult and expensive. The seed rate in this method can be reduced and plant population made more uniform by developing and introducing garden seeder/drill for sowing onion seed in lines. Most of the area in Sindh and entire crop of NWFP and Punjab is raised by sowing of seed in nurseries and then transplanting seedling in the field. In this case, requirement of seed is reduced by more than 50 per cent. However, in the existing practice of transplanting of seedlings, proper row to row and plant to plant distance needed for achieving desired plant population is not observed which results in low yields. Some area of onion in Sindh is also planted with small bulbs in August – September and harvested in November – December.

3.2 Fertilization

Onion plant is shallow rooted, hence a fairly high concentration of nutrients must be maintained in upper surface of the soil. This would require application of high doses of fertilizer. The empirical research on the response of onion to various fertilizers on different soil types at farmers' fields is lacking. The limited experimental and field information available have shown that excessive use of nitrogenous fertilizer has not only encouraged crop diseases but also lowered the keeping quality of onions. The farmers, therefore, need to be educated to use balanced doses of various fertilizers.

3.3 Irrigation

Being a shallow rooted crop, it requires frequent irrigation and water stress greatly affects its yield. The number of irrigations depend on soil type and temperature prevailing at various stages of growth. The number of

irrigations given to raise onion crop in Balochistan is high and reported to average around 17 while in other provinces, it ranges from 5 to 7. The groundwater used for onion irrigation in Balochistan is deep and expensive to mine. This is one of the most important factors contributing to high cost of production of onions in Balochistan. The sowing of seed in nurseries under plastic houses and transplanting of seedlings can help lower the water requirement of crop in the province.

3.4 Harvesting

Onions normally do not mature uniformally. The harvesting should be delayed till drying of 90 to 95 per cent of tops. In Balochistan, the tops are removed at the stage when only tips dry while the rest of the leaves are still green. Bulbs are removed/pulled out by hand a few days after cutting of tops. As a result of this practice, the moisture content of onions in Balochistan remains high. In other provinces, the onions are uprooted/pulled out alongwith tops at the stage when most of the tops have broken over. The uprooted onions are allowed to dry in the sun and tops are removed by hand either by twisting or cutting with knife. The water content of onions harvested by this method is low.

4. Storage and Processing

Onion varieties differ as to their suitability for storing. The onions lose considerable moisture for several weeks after harvesting. Varieties which lose large amounts tend to keep poorly, while those resistant to water loss are good storage onions. Because of poor storage character varieties of onion cultivated in Balochistan, the surplus of almost 200 thousand tonnes produced during 1999 could not be exported. This resulted in a net loss of over one billion rupees to Balochistan growers who got prices less than half of their cost of production. Although onion varieties grown in Sindh are suitable for storage as well as liked by the importing countries but poor contact of our exporters with their importers and non availability of ships and other associated problems in export, the quantities exported during harvest seasons of 1999-2000 crops of Balochistan and Sindh remained low despite large surplus available for the purpose.

Special types of cold stores specifically meant for storing onions are not available in the country. As a result both producers and consumers suffer. Onions can also be dehydrated and stored for marketing in ground, minced, chopped and sliced forms. Dehydrating of onions and their processing facilities into various products are lacking in the country. Absence of suitable storage, dehydration and processing facilities has resulted in the wide fluctuation in onion prices in the past and affected adversely both the producers and consumers.

5. Returns to Onion Growers

Cost of production at farm level rose from Rs 37 per 40 kgs in 1989-90 to Rs 119 in 1999-00 – more than three fold increase and giving an average increase of over 13 per cent per annum. Support price in nominal terms increased from Rs. 42 to Rs. 140 per 40 kgs (almost the same rate as the cost of production) and in real terms from Rs. 42 to Rs. 65 during the period. Support price for this crop is a myth because not much onion has been procured at the support price in the past by the Government agencies. Between 1980-81 to 1998-99, procurement was made only in six years out of 19 and that too a very small quantity ranging between 130 tonnes (out of production of 633 thousand tonnes or 0.02%) in 1987-88 to 32 thousand tonnes (out of 809 thousand tonnes production or 4%) in 1991-92.

An over supply of onions does not increase greatly the consumption of onions and when they are scarce and expensive people continue to use them in moderate amounts. Unfortunately the higher production of the crop during 1999-00 resulted in a net loss of over two billion rupees to the growers of Balochistan and Sindh on account of exceptionally low prices. Against the notional price of Rs. 140 per 40 kgs euphemistically called the support price, the market prices fell to as low as Rs. 52 in Quetta and Rs. 72 in Hyderabad in February 2000. The market price ruled lower than the notional price between December 1999 and April 2000. Balochistan had a bumper crop having produced 0.5 million tonnes. The prices crashed to Re 1 per kg against the notional support price of Rs. 3.50. Pressure from the Government of Balochistan resulted in purchase of 4,822 tonnes, mere 0.9 per cent of the crop, by PASSCO. The purchases were made at Rs. 120 per 40 kgs against the support price of Rs. 140. After adding their incidentals,

PASSCO claimed from the Government, reimbursement of a loss of Rs. 13.1 million or Rs. 2.72 per kg. By the time PASSCO geared up to sell the crop much of it may have perished. It would have made far more sense to transfer the subsidy in cash directly to the growers.

6. Production Trend

In Pakistan the area under onion crop has increased from 59 thousand (1989-90) to 110 thousand hectares (1999-00), an increase of 86 per cent. The yield increased only marginally (25 per cent) from 12 to 15 tonnes per hectare over the same period. The total production has registered an impressive increase of 132 per cent, from 0.71 million to 1.65 million tonnes. It will be noticed that the increase in production is more on account of acreage than yield. Sindh has the largest area (42 per cent) under this crop with 25 per cent each in Punjab and Balochistan. As for production, Sindh produces 41 per cent followed by Balochistan (31 per cent) and Punjab and NWFP jointly contributing 28 per cent.

In 1999-00, there was a record production of 1.65 million tonnes, a 45% increase over the previous year – owing to 24% increase in area and 13% improvement in yield. Prospects for the year 2000-01 crop are unpropitious. The Department of Agriculture, Balochistan is of the view that the area under onion crop in the province has declined by 41% from 28 thousand to 16.6 thousand hectares. The production is also likely to register a similar decline assuming productivity level to be constant. Sindh is, however, expected to produce 750 thousand tonnes, 6.5% more than the last year. There has been 4% expansion in area under the crop and the yield is expected to rise by 2.1%.

7. Availability for Consumption

During the last decade annual per capita availability of onions averaged at 7 kgs and ranged from 5.66 (1989-90) to 10.51 kgs (1999-00). The trend forecast of per capita availability for the year 2000-01 is 8.25 kg per annum. This gives just a little less than 700 grams per month or 24 grams a day which is not even a quarter of an onion per day per capita. Total requirement based on the above availability works out 1,272 thousand

tonnes (1,208 thousand tonnes for consumption plus 64 thousand tonnes for seed and wastage). This quantity will just equal the expected production in 2000-01.

8. Marketing Problems

As already explained the expansion in production results in fall of prices and growers suffer losses due to excess production. The support price meant to safeguard the interest of growers is not implemented. The growers tend to blame the implementing agency for non procurement of produce at support price while the implementing agency, namely PASSCO complain about the non availability of funds from the government and refusal of the government to pick up the losses if any, involved in this operation. As a result of this policy of non intervention in the market to assure minimum guaranteed price to the growers, the growers suffered tremendous losses during 1999-00 and earlier and are frustrated. The government has no money to implement the programme in the event of falling prices due to excess production while the growers have no alternative other than stagnating or lowering the production. In that situation, the imports become necessity at the cost of foreign exchange alongwith high prices to be paid by consumers.

There was a steep rise in prices of onion in Pakistan recently; and to overcome the situation imports had to be made. India faced an acute shortage of onion couple of years ago and it sparked a political storm. Congress Party exploited the situation by displaying a giant-sized onion in Delhi to embarrass the Government. Onion constitutes an important kitchen item of daily use in everybody's life. Its price affects the budget of even an ordinary household. The poorest in the rural areas are known to use onion as a substitute for curry to eat raw with the bread. It is a perishable commodity and its price is highly sensitive to supply during the short period of time.

Government needs to take a concrete policy decision of either (a) allowing free market mechanism of agricultural commodities and supplementing the supplies through imports to meet the shortages or (b) adopting a policy of providing incentives in the form of assured price to the growers for increasing production. In the later case, however, to minimise the procurement operations at the guaranteed price, the government

should adopt a long term export policy of agricultural commodities on regular basis by involving exporters and growers or their organizations in the export business. For this purpose, Export Promotion Bureau should help in locating the export markets and providing needed assistance to growers or their associations in undertaking exports. Undue concern for urban consumer should not impel the government to adopt a knee-jerk policy to suddenly prevent exports when there is a sudden rise in prices because once you loose the captured market you cannot regain it. The problems generally faced by the exporters of onions include in-adequate grading and shipping facilities. To promote onion production and develop its domestic and international markets government should provide, extension services including technical assistance and improved seed of recommended variety and facilitate easy availability of all necessary inputs to them. State interventions like fixing Minimum Export Price (MEP) and frequent variation in duties and tariffs on exports and imports should be given up to restore sanity in the market.

9. Recommendations

The per capita availability of onions in Pakistan needs to be enhanced. To achieve this goal, the government should undertake programmes to increase production by enhancing productivity and improving marketing. The productivity can be enhanced by:

- Arranging the supply of certified seed of tested and approved varieties both of local and exotic origin.
- Developing and introducing garden seeder for direct seeding of onions in Balochistan and initiating research for raising of nurseries under plastic houses for transplanting to help save precious and costly water in the province.
- Educating growers about increasing plant population per acre by adopting recommended row to row and plant to plant distance.
- Imparting knowledge to the growers for using proper mix of nitrogen and phosphorus fertilizers to increase their efficiency.
- Adopting proper plant protection against pests, diseases and weeds.

To encourage the adoption of recommended technology, the growers need to be assured the minimum price and return from onion cultivation. However, to minimize the procurement operation and the losses involved in the process, it is suggested that:

- The government should provide incentive to private sector for developing adequate cold storages for onions.
- Export Promotion Bureau should help private traders and growers or their associations in establishing export markets
- Government should abandon the policy of banning exports to protect local consumers, or fixing MEP, or imposing duties and taxes on exports or resorting to imports at harvest times.

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WELFARE EFFECTS OF GOVERNMENT INTERVENTIONS IN THE WHEAT ECONOMY OF PAKISTAN

By
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"Since Independence, the wheat market in Pakistan has been subject to extensive government interventions. Wheat prices are set institutionally at different levels of the market. There is extensive government involvement in procurement, storage, imports and release of wheat and there are restrictions on its inter-region movements. This intervention not only causes a huge resource transfer from growers and the government to the consumers but also inflicts an overall welfare/efficiency loss to the economy. This paper uses simulation experiments with an econometric model to quantify producers' loss, consumers' gain, government budget cost and overall efficiency loss that occurred due to government pricing interventions in the wheat market of Pakistan over the period 1973-1996. The results of the study show that interventions in wheat markets caused an average annual loss of Rs 24 to 25 billion to the producers and a cost of Rs 6 billion to the Government, while consumers gained 17 billion rupees annually. Welfare loss ranged from Rs 13 to 14 billion per annum which was 3 to 4 per cent of the real GDP from agricultural sector".

With such a heavy implicit taxation of the producers the food self-sufficiency can only be dreamed of

1. Introduction

Wheat is an important agricultural commodity in Pakistan. Its share in total cropped area is around 36 per cent [Government of Pakistan

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(2000b)]. It is the most important food to low-income consumers. The population of Pakistan is estimated to be 137.5 million and it is increasing at an annual rate of about 2.3 per cent [Government of Pakistan (2000a)]. To meet the food needs of this burgeoning population, wheat availability will have to be increased. Despite increases in yield and production, Pakistan has not achieved sustainable self-sufficiency in wheat and significant quantities are imported. It is thought that new technologies, gradual development of irrigation and drainage facilities, reclamation of water-logged and saline soils; and institutional services such as credit and extension, will bring about substantial increases in output in future. In the short-run, however, price policy is being relied upon to provide incentives to farmers to expand wheat production.

Since Independence, the wheat market has been subject to extensive government interventions. The government of Pakistan still intervenes in the system although derationing of flour occurred in 1987. The main purpose of government intervention is to provide price stability to the producers, consumers and traders. The procurement price for wheat is fixed annually by the government on the recommendation of the Agricultural Prices Commission. The procurement price is usually announced before the crop is sown. This is a price received by the farmers and private traders who sell their wheat to the government procurement centres. The procurement price acts as a floor price below which the free market price can not fall [Faruqee and Coleman (1996)]. The procurement of wheat is carried out by Federal and Provincial governments.

Partly due to government pricing policies, Pakistan is a net importer of large quantities of wheat and imports have increased over time. Decisions regarding the total quantity of wheat to be imported, time of import and quality are taken by the Ministry of Food, Agriculture and Livestock, which considers various factors such as local procurement volumes, port capacity for handling wheat and the present stock position. The government has tried to keep the price of wheat below its import parity to subsidize domestic consumers, thus involving a substantial subsidy [Hamid *et al.* (1991)]. National and international organizations are expressing the need for re-examination of the input and output pricing policies for wheat. It is thought that substantial increases in wheat yield and food self-sufficiency might be

achieved through appropriate output and input price policies and by the development of appropriate wheat varieties for different ecological zones and better targeted extension programs.

The objective of this paper is to quantify the producer loss, consumer gain, government budget cost and overall efficiency losses that occurred due to government interventions in the wheat market of Pakistan. This study follows the earlier work of Bale and Lutz (1981), Mohammad and Tahir (1988) and Barkley (1992). Methodology adopted is explained in Section 2 while in Section 3 and 4 results of the static and dynamic welfare analyses have been presented. Comparison of results is given in Section 5 and finally conclusions drawn are summarized in Section 6.

2. Methodology

An econometric model was developed for the wheat economy of Pakistan [Ashfaq *et al.* (1999) and Ashfaq, Griffith and Parton (1999)]. The linear model consisted of ten equations and four identities. The period of estimation was from 1973-74 to 1995-96. The model was estimated simultaneously by using the TSP package. The supply and demand elasticities estimated and used were 0.092 and -0.44.

Prices received by farmers were assumed to be the procurement price. The world price was assumed to be the import parity price as the country had been the net importer of wheat in the past. It was calculated by adding the unloading cost of wheat and inland freight charges to the cif price of wheat for each year of the sample period. Production and imports data were taken from Government of Pakistan (2000a and 2000b). The data series on GDP from the agricultural sector was obtained from the World Bank's World Tables (1995) and Government of Pakistan (2000a).

3. Static Welfare Analysis

In the static welfare analysis, it is assumed that the government takes decisions each year regarding wheat price and other policies. In the analysis, the impacts of those policies are measured each year. The static welfare impacts of government wheat price policy during the study period in

Pakistan are presented in Table-1 in the form of five years average values. The impact has been measured by comparing the results and decisions made when the procurement price was received by farmers with those should the import parity price was received. The results show the transfer of economic surplus from producers and tax payers to consumers and the net welfare losses to the society due to the subsidy on imports in 1999-00 rupees. The results vary from year to year on the basis of production and imports and their prices. The welfare loss to society was particularly large in 1974-75. The costs in that year represented about 14.5 per cent of the Gross Domestic Product (GDP) from the agricultural sector.

Table 1: Static Welfare Results of Wheat Price Policy (1999-00 Rupees)

(Billion rupees per annum)

Period	Loss in producer surplus	Gain in consumer surplus	Government budget cost	Net welfare loss	Welfare loss as % of G.D.P from agriculture
1973-78	21.01	9.15	6.99	18.85	6.87
1978-83	19.95	13.71	4.26	10.50	3.11
1983-88	26.66	15.32	4.42	15.76	3.84
1988-93	27.53	22.31	7.04	12.26	2.37
1993-96	26.28	24.20	8.34	10.42	1.61
Mean	24.29	16.94	6.21	13.56	3.56
Years of highest values					
1974-75	23.23	2.93	6.55	26.85	14.48
1995-96	29.69	24.94	9.94	14.69	3.17

The producer loss, consumer gain and government budget cost were highest in absolute terms in 1995-96. Over the period of study, average annual producer loss was 24.29 billion in 1999-00 rupees and the annual average government budget cost was 6.21 billion rupees. The average annual consumer gain during this period was 16.94 billion rupees, thus, inflicting an annual welfare loss of 13.56 billion rupees to the society which amounted to 3.56 per cent of GDP from the agricultural sector.

4. Dynamic Welfare Analysis

In the dynamic welfare analysis, it is assumed that government takes certain decisions regarding price etc., for a certain set of years. The impact of these policies on producers, consumers, government and overall effects on the society are measured for different scenarios. Table-2 shows the five years average results of the dynamic comparison of the existing wheat price policy with import parity price policy scenario during the period 1973-74 to 1995-96. The value of producer loss, consumer gain, government budget cost and net welfare loss to the society vary from year to year. The producer loss, consumer gain and government budget cost were highest in 1995-96. The average annual producer loss during the period of study was 25.37 billion rupees and cost to government budget, 6.15 billion rupees. The annual gains to consumers during the same time period averaged at 16.94 billion rupees. Thus, inflicting on an average a net welfare loss of Rs 14.58 billion (1999-00 rupees) to the society, which was about 3.93 per cent of GDP from the agricultural sector. The net welfare loss reached its maximum in the year 1974-75, which was about 15 per cent of GDP from the agricultural sector.

Table-2: Dynamic Welfare Results of Wheat Price Policy (1999-00 Rupees)

(Billion rupees per annum)

Period	Loss in producer surplus	Gain in consumer surplus	Government budget cost	Net welfare loss	Welfare loss as % of G.D.P from agriculture
1973-77	22.00	9.30	6.89	19.60	7.14
1978-82	21.19	13.83	4.29	11.65	3.44
1983-87	27.38	15.08	4.66	16.96	4.14
1988-92	28.88	22.22	7.01	13.68	2.64
1993-96	27.38	24.27	7.90	11.02	2.28
Mean	25.37	16.94	6.15	14.58	3.93
Years of highest values					
1974-75	23.48	2.93	6.72	27.27	14.70
1995-96	30.79	24.80	9.28	15.27	3.30

Comparing the mean values of static and dynamic welfare results of the same policies, we observe that the loss to producers and overall welfare loss to the society are more in the case of the dynamic welfare analysis. The gain to the consumer is almost same and the government budget costs are slightly less in the case of the dynamic welfare analysis.

5. Comparison of the Results with Barkley's Study

Barkley (1992) calculated the static welfare effects of wheat price policy in Pakistan for the period 1971-72 to 1986-87 by assuming linear supply and demand curves and a supply elasticity of 0.43 from [Pinckney (1989)] and a demand elasticity of -0.25 from [Ahmad *et al.* (1987)]. A comparison of his results with those of the present study is given in Table-3.

Table-3: A Comparison of Welfare Effects

Item	Present Study (Constant 1999-00)	Barkley's Study (Constant 1980)
Loss in producer surplus	24.29	12.08
Grain in consumer surplus	16.94	9.39
Government budget cost	6.21	1.06
Total welfare loss	13.56	3.75
Period of study	1973-96	1971-87

The results of the present study and Barkley's study look quite different, however these differences can be explained as below:

i) Barkley took 1980 as his base year while the present study took 1999-00 as the base year. During the period, 1980 to 2000, Consumer Price Index (CPI) more than quadrupled (4.44 times). Converting Barkley's figures to 1999-00 values would give a loss in producers surplus of 53.64 billion rupees, gain in consumers surplus of 41.69 billion rupees, government budget cost of 4.71 billion rupees and net welfare loss of 16.66 billion rupees.

ii) The present study measures the welfare effects of wheat which is actually entering the market and taking part in price formation (the marketed surplus). The quantity is about 40 per cent of total production. Barkley measured welfare impacts on the basis of total output. Converting Barkley's results to marketed surplus basis producers loss, consumers gain, government budget cost and welfare loss calculate to 21.46, 16.68, 1.88 and 6.66 billion rupees (constant 1999-00) respectively. Producers loss and consumers gain are much closer to the results of the present study.

iii) Larger quantities of wheat were imported and international prices increased more rapidly during the 1990s, therefore, government budget cost and welfare loss is significantly greater in the present study which includes this period also.

iv) Barkley borrowed the supply elasticity (0.43) and demand elasticity (-0.25) from other studies to measure welfare effects. The present study used its own econometrically estimated supply elasticity (0.092) and demand elasticity (-0.44) [Ashfaq *et al.* (1999), and Ashfaq, Griffith and Parton (1999)].

v) There was a wider gape between the producer price and consumer price during Barkley's study period.

6. Conclusions

The welfare impact of wheat price policy during the period of study showed the transfer of economic surplus from producers to consumers, government budget cost due to subsidy on imports and overall total welfare loss to the society. The producers' loss, consumers' gain and government budget cost were highest in year 1995-96 for static comparison. The welfare loss to society was particularly large in 1974-75. The mean annual welfare loss was 3.56 per cent of real GDP from the agriculture sector.

The results of the dynamic welfare analysis also showed a big transfer of economic surplus from the producers to the consumers, government budget costs and overall welfare losses to the society. The

producer loss, consumer gain and government budget costs were highest in 1995-96. The overall welfare loss to the society was larger in 1974-75, like the static welfare analysis. The average annual welfare loss in real terms was 3.93 per cent of real GDP from the agriculture sector. The dynamic welfare losses in terms of per cent of real GDP from agriculture sector, are greater as compared to static welfare losses. The results are consistent with Barkley's study conducted in 1992.

An increase in the domestic price of wheat would lead to Pakistan becoming self sufficient or even a net exporter of wheat. But there are many other predicted changes in the Pakistan wheat market which may not be acceptable to the government and a common consumer. A good policy might be a gradual increase in wheat price along with other institutional support in which case Pakistan may be marginally self-sufficient, i.e. a fluctuating situation between a net importer and a net exporter. Government can continue to play its role for price stabilisation. A gradual withdrawal from the market is desirable because during the process private sector will prepare itself to take over various activities such as stock holding.

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SOCIAL PROFITABILITY OF WHEAT AND OILSEEDS PRODUCTION IN PAKISTAN

By
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"Huge amounts of foreign exchange are annually spent on the import of wheat and edible oils. It has ever been a policy concern for the government to minimize their import bill through inter alia encouraging domestic production. However, given the constrained availability of cultivated land and water we have to opt either for wheat or for oilseeds. This paper investigates which of the two is socially more profitable to produce at home. The analysis carried out indicates that wheat production has an edge of Rs 3,323 per acre over sunflower and of Rs 801 over canola cultivation. Social cost benefit and domestic resource cost ratios are lower for wheat than for oilseeds implying again the comparative profitability of the former over the latter. Being both import commodities, promotion of oilseeds at the cost of wheat, thus may not be desirable. Instead of providing protection and institutional and financial support, emphasis should be on enhancing per acre yields of sunflower and canola, the only two promising crops for increasing domestic edible oil production and hence curtailing edible oil import bill. For improving yield of sunflower and canola a number of recommendations have been included in the paper."

From food security point of view too, wheat is more desirable to produce at home than to import from abroad

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1. Introduction

Pakistan is a net importer of both wheat and edible oils. In case of wheat, 10-20 per cent of national consumption is met through imports while for edible oils this proportion goes as high as 70 per cent. During 1999-00, import bill for the two commodities amounted to US $ 275 million and 415 million respectively [Economic Survey (1999-00)]. Huge amount of foreign exchange spent on import of these two commodities has ever been a policy concern and continuous efforts have been made to minimize it by increasing their domestic production.

In the past two decades, production of wheat has increased @ 2.9% per year – close to the population growth rate, whereas production of edible oils increased @ 4.4 per cent per annum. The increase in edible oil production came mainly from (i) increase in production of cotton – of which oil is a by-product, and (ii) expansion in the area under two non-traditional oilseeds viz. sunflower and canola which have been promoted by extending institutional support, ensuring minimum guaranteed prices and providing protection through high tariff walls. Despite this support, oil production from these two sources could not increase beyond a hundred thousand tonnes. The other two non-traditional oilseed crops viz soyabean and safflower failed completely to gain roots as oil crops inspite of all efforts made in this direction.

Sunflower and canola, no doubt, have responded to the support and protection provided by the Government to oilseed growers. The current production of sunflower (1998-99) is reported at 188 thousand tonnes whereas that of canola is estimated at 88 thousand tonnes. Total oil from these two crops assuming 35 per cent recovery is calculated at 97 thousand tonnes. Thus, these two crops seem to have some potential to meet our future edible oil requirements. But in view of the prevailing cropping pattern, scope for exploitation of this potential is limited. Sunflower and canola are both rabi crops and compete for land and water with wheat in which we are deficient too. Given constrained availability of cultivated land and water we have to opt either for wheat or for sunflower/canola.

In recent years (1994-95 onward) import of wheat has been rising whereas those of edible oils declining. There could be two possible factors for this trend. Firstly, it has been the policy of the government to subsidize import of wheat and tax that of edible oils heavily, thus, encouraging import and discouraging domestic production of wheat and vice versa for edible oils. Secondly, institutional and price support provided to oilseed growers encouraged domestic production of oilseeds. In contrast, support price of wheat has been used as a means of taxing the growers and providing cheap wheat to the urbanites. Imposition of section 144, compulsory procurement of wheat by Provincial Food Departments and provision of cheap and subsidized wheat to the flour mills have rendered the support price as a penalty price to the wheat growers.

Government policies regarding support prices, tariff and taxes and institutional development play important role in promotion/demotion of agricultural crops. Pakistan imports both wheat and edible oil. In this perspective it seems pertinent to study social profitability of wheat cultivation and competing oilseed crops to seek justification for promotion and market support rendered to sunflower and canola crops and taxing the wheat growers. This paper analyses social profitability in cultivation of wheat and oilseeds i.e., sunflower and canola.

2. Analytical Framework

The social profitability of cultivation of wheat and oilseeds has been assessed through following three criteria:

- Net social returns per unit of land
- Social cost benefit ratio
- Domestic resource cost

Net returns per unit of land from different crops is at the core of comparative economics for growers. Allocating one acre of farm land to a crop costs in terms of inputs use levels and their prices and gives income in terms of output produced and its price. If a crop gives higher net returns (total income minus total cost) than competing crops, a rational grower

should prefer cultivation of that particular crop over competing ones and vice versa. Thus, for a farmer we define:

$$R = Y - C$$

Where

R = Net returns from cultivation of a specific crop on one acre

Y = Total income from output of one acre evaluated at domestic market prices

C = Total cost (excluding land rent) incurred in cultivation of a specific crop on one acre after accounting for input cost and recovery proceeds from by-products, all evaluated at domestic market prices.

However, economics or profitability of a society or country differs from that of a grower. It differs on two accounts. Firstly, for the growers domestic prices are relevant whereas for the society as a whole domestic market prices particularly of tradables are meaningless. Thus, in order to determine national or social profitability all the tradables are to be imputed on border prices. Secondly, growers are only concerned with the raw product such as oilseeds and sugarcane and not with processed ones such as edible oil and sugar. But oilseeds and sugarcane are rarely traded across borders. Commodities commonly traded across the borders are edible oils and sugar. Thus, to compare the profitability at the national level, further processing cost of oilseeds into oil or of sugarcane into sugar and recoveries of by-products thereof would need to be accounted for.

Keeping the above points in view, we redefine the variables of the above cost - income equation to apply it to the society or a country.

R = Net returns from the production of a tradable from one acre

Y = Total income derived from the production of a tradable from

one acre evaluated at the world or equivalent border prices. In this exercise actual c & f prices of wheat and edible oils have been used as we are permanent importer of both of these commodities.

C = Total costs incurred in the production of a tradable from one acre including cultivation, marketing and processing costs and accounting for recovery proceeds from the sale of by-products; all inputs, costs and by-products evaluated at world or equivalent border prices. In this exercise, however, domestic market prices of inputs and by-products have been used as proxy for world prices. Though there are some tradable inputs such as chemical fertilizers, pesticides and diesel which should be evaluated at border prices, but due to paucity of required data, these are also evaluated at domestic market prices. However, it will not affect the results much because (1) most of farm inputs neither involve significant subsidy nor heavy taxation, meaning that domestic prices of tradable inputs are more or less close to the border level economic prices and (2) all the crops included in the analysis use almost the same inputs mix such as of fertilizers, diesel for running tractors and tubewells etc., thus, imputation of costs at domestic prices would not affect the direction of results significantly.

3. Data and Sources

The analysis covers 10 years' period i.e. 1990-91 to 1999-00 so that comparative profitability can be judged on long-term basis. The main source of data is the APCom's Support Price Policies on Wheat and Non-traditional Oilseed Crops for the years 1990-91 through 1999-00. The paper uses time series data on per acre yields, cost of production, marketing and processing costs, recovery ratios, prices of various by-products, import prices, and domestic resource cost ratios relating to wheat and oilseeds/edible oils as reported in these policy reports. The other sources are Federal Bureau of Statistics, Finance Division, Economic Advisor's Wing and Ministry of Food, Agriculture and Livestock.

4. Results

4.1 Net social returns per acre

Year-wise detail of cost, income and net returns pertinent to cultivation of wheat, sunflower and canola are presented in Annexes-I to III, however, average results thereof are summarized in the following paragraphs.

Yield of irrigated wheat during the period under consideration averaged at 0.841 tonnes per acre and its cost of production inclusive of marketing expenses less value of wheat straw worked out to Rs 2,862. If this much quantity of wheat (0.841 tonnes) is evaluated at the average c & f price, total income received would calculate to Rs 4,786. Thus, allocation of one acre of land to wheat gave net returns worth 1,924 current and 2,655 constant (1999-00) rupees (Annex-I).

On the other hand, yield of sunflower averaged at 0.503 tonnes of seed or 171 kgs of oil (assuming 34% oil recovery) per acre. Per acre cost of production of sunflower oil – inclusive of farm level expenses, marketing expenses and processing costs after adjusting for receipts from by-products, is estimated at Rs 3,930 (Annex-II). Import value of 171 kgs of sunflower oil at average c & f price calculates to Rs 3,478 resulting in negative net returns worth (-)452 current and (-)668 constant (1999-00) rupees.

On the basis of 35 per cent oil recovery, per acre oil production of canola averaged at 180 kgs during the review period, 1996-97 to 1999-00 (data for canola were available only for this period). Average per acre gross cost of cultivation, marketing and processing to extract 180 kgs of canola oil turns out to be Rs 4,679. Subtracting a sum of Rs 1,530 (by-product sale proceeds) from this amount cost of production happens to be Rs 3,148. Import value of 180 kgs of oil during the analysis period would calculate to Rs 4,792. Thus, allocation of one acre of land to canola on an average yielded net returns worth 1,644 current and 1,854 constant (1999-00) rupees (Annex-III).

The above results are condensed in Table-1. It can be concluded that cultivation of sunflower over an acre instead of wheat entails a loss of Rs 2,376 (1,924 as a loss for not cultivating wheat and Rs 452 as a loss from sunflower cultivation) current rupees or a loss of 3,323 (2,655 + 668) constant (1999-00) rupees. As far as canola is concerned it has an edge over sunflower of 2,096 (1,644 + 452) current and 2,522 (1,854 + 668) constant (1999-00) rupees. Wheat, however, depicts advantage over canola too. In current rupee this edge is of Rs 280 (1,924 – 1,644) and in 1999-00 rupees it is Rs 801 (2,655 – 1,854).

Table-1: Cost, Income and Returns Per Acre of Wheat, Sunflower and Canola: Average 1990-91 through 1999-00

(Rs per acre)

	Wheat	Sunflower	Canola
Cost in current rupees	2,862	3,930	3,148
Income evaluated at current c & f prices	4,786	3,478	4,792
Net returns in current rupees	1,924	-452	1,644
Net returns in constant (1999-00) rupees	2,655	-668	1,854

Source: Annexes-I to III.

4.2 Social cost-benefit ratios

The results in Table-1 can also be put in terms of social cost – benefit ratios (SCBR). It is just a ratio between the cost incurred on and income derived from one acre. Average social cost benefit ratio for the period under review calculated for wheat is 0.60 which is lower than sunflower (1.13) and canola (0.68), again showing an edge in wheat cultivation over sunflower or canola. However, canola enjoys margin over sunflower. Year-wise detail of social cost-benefit ratios in respect of wheat, sunflower and canola is presented in Table-2.

Table-2: Social Cost-Benefit Ratios for Wheat, Sunflower and Canola Cultivation: 1990-91 Through 1999-00

Year	Social Cost Benefit Ratios for		
	Wheat	Sunflower	Canola
1990-91	0.61	1.33	-
1991-92	0.51	1.16	-
1992-93	0.59	1.50	-
1993-94	0.63	1.35	-
1994-95	0.79	0.95	-
1995-96	0.44	1.01	-
1996-97	0.51	1.17	0.72
1997-98	0.59	0.92	0.53
1998-99	0.81	0.96	0.61
1999-00	0.62	1.57	0.87
Average	0.60	1.13	0.68

Source: Annexes (I through III).

4.3 Domestic Resource Cost (DRC)

Domestic resource cost (DRC) coefficient is the most common measure of economic efficiency of domestic resource use. This measure not only compares economic efficiency of different crops within a country but it also helps to compare it across different countries. DRC coefficients refer to the value accruing to economy at international prices by domestic resources utilized in an enterprise at home. In simple terms, it reflects cost of earning foreign exchange. DRC coefficient if less than unity it means cost of domestic resources to earn one dollar of foreign exchange is less than one dollar and vice versa. Lower the DRC coefficient value the higher will be the profitability and vice versa. DRCs calculated for the last five years, 1995-96 through 1999-00 for wheat, sunflower and canola as given in support price policy reports on non-traditional oilseed crops are presented in Table-3.

Table-3: Domestic Resource Cost Coefficients (DRCs) Estimated for Sunflower, Canola and Wheat: 1995-96 through 1999-00

Year	Sunflower	Canola	Wheat (Punjab)	Wheat (Sindh)
1995-96	0.58	0.52	0.37	0.38
1996-97	0.99	0.75	0.45	0.46
1997-98	0.63	0.69	0.50	0.50
1998-99	0.70	0.66	0.59	0.60
1999-00	1.53	1.30	0.62	0.59

Source: Support Price Policy for Non-traditional Oilseeds: 2000-01 Crop.

Coefficients given for wheat, sunflower and canola in the above table reflect that cost of earning/saving foreign exchange through sunflower and canola has been higher than earning through wheat throughout the period under review i.e. 1995-96 to 1999-00, and more specifically during 1999-00. This quantitative support corroborates to the results discussed earlier implying that socially wheat cultivation is advantageous to Pakistan in contrast with oilseeds.

5. Reasons for Low Profitability of Oilseeds

5.1 Difference in the yield levels of wheat and oilseed crops

Higher net returns to wheat are primarily attributable to higher per acre yield of wheat as compared with sunflower and canola. Yield of wheat during the study period averaged at 0.841 tonnes per acre against 0.503 tonnes of sunflower and .514 tonnes of canola. Yield improvement in wheat entails to varietal development, massive improved seed distribution, price assurance through support price system and availability of necessary marketing infrastructure to clear bulk supplies flowing from the farmers, particularly during the peak supply (harvest) season. Contrarily, oilseeds are low yielding [Chaudhry, Mahmood and Chaudhry (1998)]. Technological breakthrough in oil crops has been uncommon.

5.2 Availability of seed

For sunflower hybrid seed is recommended for cultivation in the country. Entire quantity of seed is imported and its cost is very high. The cost of production of locally developed hybrid seed of sunflower is low and its yield potential is at par with imported seed, but its production is confined to research stations only. Local production of quality seed of canola is meager. Imported seed is expensive and majority of the growers cannot afford to buy it, which adversely bears upon cultivation and yield of the crop. The imports are not subject to any regulations and even materials which have not passed through tests/experimentation are also imported. At the same time quality of the imported seed is not satisfactory as it is imported through private traders and quality control measures are not strict enough to control quality of the imported material.

Lack of facilities with research institutes for estimating glucocynolate contents and high testing fee charged by NARC hinders the production of quality nuclear seed of various varieties of canola. Also due to lack of appropriate distribution net work available to researchers its outreach is constrained.

5.3 Availability of technology package for oilseeds

Farmers in general are not aware of the agronomy of sunflower and canola which has negative bearing on their yield levels. Cultivation practices are not standardized. Varieties suitable for different regions/locations are not developed. Sunflower and canola may be intercropped with other crops but suitable varieties capable of adjusting in different cropping patterns have not been developed/identified. Sunflower hull which is a valuable by-product, but due to lack of proper outlets for its disposal, returns from the crop are undermined.

5.4 Difference in the production cost of wheat and oilseed

Production cost estimates also explain lower returns to sunflower and canola. During the study period domestic costs of production of sunflower and canola have been higher relative to wheat. It is evident from Annex-I to

III that per acre cost of production of sunflower and canola averaged at Rs 3,930 and 3,148 respectively against Rs 2,862 for wheat. Higher costs of production involved in cultivation of sunflower and canola undermine net returns from these crops.

5.5 Low international prices of edible oils

Besides production cost, import value of sunflower is also a causative factor behind its lower returns. It is revealed from the analyses that import value of wheat realized from an acre of land has happened to be higher than sunflower and at par with canola. During the review period import value of an acre's production of wheat averaged at Rs 4,786 against 3,478 for sunflower and an equal amount (Rs 4,792) for canola. Though canola approximates with wheat but other problems like higher cost of production and off-farm problems allied with the crop undermine net returns from the crop.

6. Conclusions and Recommendations

This paper purports to examine government policy to promote cultivation of non-traditional oilseeds in Pakistan. Two important non-traditional oilseeds i.e sunflower and canola, were focussed in the paper. Comparative economic analysis of sunflower, canola and wheat – as sunflower and canola directly compete with wheat for land and other farm resources, is carried out to discover economic viability of these crops. The major conclusion following from the analysis is that wheat cultivation has been more profitable than sunflower and canola during 1990-91 to 1999-00. – the period reviewed in the paper. During the study period net returns per acre from wheat averaged at Rs 2,655 against (–) 668 from sunflower and 1,854 from canola, all in 1999-00 rupees. Furthermore, import value of wheat recoverable from one acre of land is higher than the import value of sunflower oil recoverable from same area of land while it approximated with that of canola. In case of wheat import value amounted to Rs. 4,786 against 3,478 from sunflower and Rs. 4,792 from canola. Thus, economically wheat turns out to be more promising than sunflower or canola. Consequently the conclusion does not support the policy to expand non-traditional oilseeds

cultivation at their current levels of yields and costs as these compare unfavorably with wheat in Pakistan.

The analysis presented in Section 4 and discussion made in Section 5 have revealed that relatively lower net returns from sunflower and canola are due to lower yields of these crops as compared to wheat, high cost of imported seed of oilseeds, non-development of proper technology package for cultivation of oilseed as a single and inter crop under different cropping patterns. Thus, in the first instance any drive towards increasing local production of edible oils should be focussed on improving yield potential of sunflower and canola by developing and introducing needed technological package and local production of hybrid seed at low cost.

Edible oil industry in Pakistan is not developed enough to perform efficiently and suffers even from fundamental problems. Improvements in oil recovery from these crops would supplement to existing edible oil production. The storage of oilseeds at high temperature prevailing at harvest lowers recovery of oil and its quality. This requires provision of storage at controlled temperature to procurement agency as well as industry.

Finally, the existing marketing system for the disposal of oilseeds is repugnant to farmers. Users (millers) of oilseeds are in monopsonistic position. Thus, support price system for oilseeds needs to be made effective. However, support prices should not be fixed far off their import parity prices.

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Annex-I

NET RETURNS FROM ALLOCATING AN ACRE TO WHEAT CULTIVATION

S.No	Item	Unit	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	Average
1.	Yield	Tons/acre	0.75	0.81	0.79	0.77	0.84	0.82	0.83	0.91	0.88	1.01	0.841
2.	Cost at farm gate excluding land rent	Rs/acre	1431	1737	1930	2328	2430	2633	2997	3833	3946	4112	2738
3.	Marketing cost	Rs/acre	55	65	76	109	109	109	131	175	196	218	124
4.	Cost at market level excluding land rent (2+3)	Rs/acre	1486	1802	2006	2437	2539	2742	3128	4008	4142	4330	2862
5.	Import (c&f) price in US $	Per tonne	146	175	166	166	125	228	190	174	125	135	163
6.	Import (c&f) price in Pak. Rupees	Per tonne	3267	4349	4315	5014	3844	7647	7409	7494	5844	6932	5612
7.	Import value of wheat produced from one acre (item 1 * Item 6)	Rs/acre	2450	3523	3409	3861	3229	6271	6149	6820	5143	7001	4786
8.	Net returns from one acre in current (rupees) (item 7 – item 4)	Rupees	964	1721	1403	1424	690	3529	3021	2812	1001	2671	1924
9.	Net returns from one acre in constant (1999-00) rupees	Rupees	2150	3470	2576	2350	1007	4651	3562	3074	1035	2671	2655
10.	Social cost benefit ratio (4/7)		0.61	0.51	0.59	0.63	0.79	0.44	0.51	0.59	0.81	0.62	0.60

Notes:

i) Yield figures represent irrigated area crop yield

ii) Net returns in constant rupees are calculated by deflating current net returns with CPI (1999-00=100)

Source:

Support Price Policy for Wheat: Annual reports for different years extending from 1990-91 through 1999-00.

Annex-II

NET RETURNS FROM ALLOCATING AN ACRE TO SUNFLOWER CULTIVATION

S.No	Item	Unit	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	Average
1.	Yield of seed	Tons/acre	0.447	0.532	0.441	0.447	0.507	0.514	0.527	0.533	0.546	0.531	0.503
2.	Yield of oil (34% of item 1)	Tons/acre	.152	.181	.150	.152	.172	.175	.179	.181	.186	.181	.171
3.	Cost at farm gate excluding land rent	Rs/acre	2186	2391	2605	2853	3428	3887	4656	4973	5307	5326	3761
4.	Marketing cost	Rs/acre	70	75	75	75	75	83	98	120	135	150	96
5.	Processing cost	Rs/acre	313	495	1072	1055	1014	1285	1275	1290	1321	1211	1033
6.	Recovery from by products	Rs/acre	624	905	1032	962	933	885	1178	1178	1178	720	960
7.	Total cost at market level excluding land rent (3+4+5-6)	Rs/acre	1945	2056	2720	3021	3584	4370	4851	5205	5585	5967	3930
8.	Import (c&f) price of oil in US $	Per ton	429	393	465	489	710	740	593	722	623	410	557
9.	Import (c&f) price of oil in Pak rupees	Per ton	9620	9764	12079	14760	21892	24706	23099	31273	31254	21053	19950
10.	Import value of oil produced from one acre (item 2 x item 9)	Rs/acre	1462	1766	1811	2243	3774	4318	4139	5667	5802	3801	3478
11.	Net returns from one acre in current rupees (item 10 – item 7)	Rupees	-483	-290	-909	-778	190	-52	-712	462	217	-2166	-452
12.	Net returns from one acre in constant rupees	Rupees	-1077	-584	-1668	-1283	277	-69	-840	506	224	-2166	-668
13.	Social cost benefit ratio (7/10)		1.33	1.16	1.50	1.35	0.95	1.01	1.17	0.92	0.96	1.57	1.13

Notes: i) Yield figures represent irrigated area crop yield

ii) Net returns in constant rupees are calculated by deflating current net returns with CPI (1999-00=100)

Source: Support Price Policy for Non-traditional Oilseed Crops; Annual reports for different years extending from 1990-91 through 1999-00.

Annex-III

NET RETURNS FROM ALLOCATING AN ACRE TO CANOLA CULTIVATION

S.No.	Item	Unit	1996-97	1997-98	1998-99	1999-00	Average
1.	Yield of seed	Tons/acre	0.527	0.532	0.498	0.498	0.514
2.	Yield of oil (35% of item 1)	Tons/acre	0.184	0.186	0.174	0.174	0.180
3.	Cost of seed at farm gate excluding land rent	Rs/acre	3165	3186	3489	3624	3366
4.	Marketing cost	Rs/acre	81	100	112	125	105
5.	Processing cost	Rs/acre	1252	1264	1183	1133	1208
6.	Recovery from by products	Rs/acre	1443	1488	1488	1702	1530
7.	Total cost of oil at market level (3+4+5-6)	Rs/acre	3055	3062	3296	3180	3148
8.	Import (c&f) price of oil in US $	Per ton	593	722	623	410	587
9.	Import (c&f) price of oil in Pak rupees	Per ton	23099	31273	31254	21053	26670
10.	Import value of oil produced from one acre (item 2 * item 9)	Rs/acre	4250	5817	5438	3663	4792
11.	Net returns from one acre in current rupees (item10 - item 7)	Rupees	1195	2755	2142	483	1644
12.	Net returns from one acre in constant (1999-00) rupees	Rupees	1473	3148	2311	483	1854
13.	Social cost benefit ratio (item 7/item 10)		0.72	0.53	0.61	0.87	0.68

Notes:

i) Yield figures represent irrigated area crop yield

ii) Net returns in constant rupees are calculated by deflating current net returns with CPI (1999-00=100)

Source: Support Price Policy for Non-traditional Oilseeds: Annual reports for different years extending from 1990-91 through 1999-00.

MICRO-FINANCE – THE MOST EFFECTIVE INSTRUMENT IN POVERTY ALLEVIATION

By
Rauf Ahmad Sheikh*

..... so that wealth should not continue circulating among the rich only

"The increasing number of poor in the world, especially in African and Asian countries is a matter of serious concern. About 36% of the hungry people of the world live in South Asia and 6% in Pakistan. This 6% constitutes 34% (49 million) of Pakistan's total population. Inadequate resource allocation to education, healthcare and rural development has been adding more numbers in the pool of the deprived and poverty stricken. Availability of micro-finance both in rural and urban areas for establishing micro-enterprises can play a vital role in poverty alleviation in Pakistan. Poverty reduction is a high priority objective of the present government. In this regard, the National Development Strategy, and the role of Development Financial Institutions (DFIs), Commercial Banks (CBs), Provincial Cooperative Banks and NGOs have been discussed in this paper. The limitations of these financial institutions have also been discussed. Above all, this article analyses the constraints in expansion of micro-finance in Pakistan and suggests remedial measures."

1. Introduction

There is growing realization globally that inequitable distribution of financial resources has tended to widen gap in income levels of people

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especially, of those living in developing countries. Government policies favoured the elite class and deprived the disadvantaged from their due share in national resources precluding their role in economic development. Alarming incidence of poverty in African and Asian countries is the outcome of vision starved national strategies for the development of human resources and Pakistan is not exception to that. Financial resources in national development plans were not provided to a level needed to develop social sector (education, health, sanitation, communication etc.), for the welfare of the impoverished. The financial position of disadvantaged people who some time back were above the poverty line deteriorated further pushing them to below poverty line and only a few among those already below poverty line could move upward.

The world is entering the 21st century with high poverty rate and terrible deprivation compelling more than 800 million people to sleep hungry at night despite the fact that world food production is more than sufficient to feed the present world's six billion inhabitants. Though, global figure has decreased from 960 million 30 years ago but Asia and Africa remains a focus of serious concern [FAO (1999)]. Some 791 million (99%) of hungry people live in the developing world. Out of which 284 million live in South Asia and roughly 49 million (6% of world total and 17% of South Asia) in Pakistan. These 49 million constitute 34% of Pakistan's total population, 37% in the rural areas and 28% in urban areas. It is worth noting that there has been significant increase in poverty during nineties in Pakistan. The incident of caloric based poverty in Pakistan has increased from 17.3% in 1987-88 to 32.5% in 1998-99. [Economic Survey, 1999-2000 (2000)].

Poverty reduction is a high priority goal of the present government. There is general consensus that rapid sustainable growth must be accompanied by direct poverty alleviation measures and anti-poverty programs. Most important among such measures are development of social sectors such as health, education and sanitation and increased provision of credit to the poor for investment in potential micro-enterprises. For increasing farm production and uplifting the non-possessed, it is important to promote economic opportunities for the impoverished especially those living in the rural areas. It is imperative that credit and services be provided

to them so that they can emerge out of their poverty through financially viable and productive activities.

2. National Development Strategy

In past serious efforts have not been made for reduction of poverty. Lack of proper resource spending on education, health and rural development added more numbers in the pool of poverty making their lives harsher than before. The poor being at the bottom of the pyramid have suffered the most. The strategies for kick starting the process of economic revival have not been blessed with any special vision.

As a part of 7-point economic agenda of Chief Executive of Pakistan, poverty alleviation is one of the high priority goals of the present government. Pakistan Poverty Alleviation Fund (PPAF), as a first step in this direction, has been set up with an initial allocation of Rs. 35 billion. The program comprises five major components namely; (1) establishment of Micro-finance/Khushhali Bank; (2) an integrated small works program; (3) a food support program where under about 1.2 million poor households with a monthly income of upto Rs. 2,000 will receive an annual cash subsidy of Rs. 2,000 in two installments; (4) revamping the Zakat system; and (5) an higher allocation for social programs in the federal budget.

Further measures that Government intends to take include boosting up farm productivity, involvement of main stream credit institutions/commercial banks in micro-finance by increasing share of agricultural and rural credit in credit plan of the country, increased investment in rural development especially in social sector (education, health, sanitation, etc.) and empowering the people through devolution of powers to grass root level.

The Federal Government is set to evolve an Action Plan to ensure food security, self-reliance and transformation of agriculture into a demand oriented sector. Steps to be taken in this direction include self-sufficiency in food grains, incentives for import substitution for crops like edible oils, tea, etc., introduction of corporate farming to attract private sector investment,

and emphasis on production of horticultural crops such as fruits, vegetables and floriculture.

3. Micro-Finance Arrangements

As part of poverty alleviation program, financial institutions have made allocations for micro-finance in their credit plans. These are summarized below:

i) Agricultural Development Bank of Pakistan (ADBP) has ear-marked Rs. 500 million to extend credit facilities to micro-entrepreneurs and has also created Micro-Credit & Special Schemes Department in its Head Office to monitor the operations of micro-finance. Under micro-finance scheme maximum loan ceiling is Rs. 25,000 per client. ADBP provides these small loans to micro-entrepreneurs through its network of 345 branches in the country and 1,449 Mobile Credit Officers (MCOs) working in these branches. Since July, 2000 a total amount of Rs 13.22 million has already been disbursed to 581 beneficiaries under this scheme.

ii) First Women Bank which provides small loans (maximum loan ceiling is Rs. 50,000 per client) has also set up Micro Credit Cell to cater the credit needs of women entrepreneurs.

iii) Micro-Finance Bank (MFB) has been established through Ordinance, 2000 promulgated on August 5, 2000. Its paid-up capital will be subscribed by such banking companies, financial and other institutions as the State Bank of Pakistan may determine from time to time. Formula to allocate equity of Micro-Finance Bank to Commercial Banks is based on proportionate share of Bank in the scheduled banks' total deposits. National Bank of Pakistan will subscribe Rs. 400 million towards paid-up capital of MFB whereas Habib Bank Limited and Muslim Commercial Bank are to subscribe Rs. 300 million each for this purpose and Allied Bank Limited and United Bank Limited, Rs. 200 million each. Foreign Banks will subscribe Rs. 350 million and the balance will be subscribed by other local private banks. The shares of Micro-Finance Bank held by the

banks will be treated as part of statutory liquidity ratio (SLR), which the commercial banks are required to meet under the law. The Bank is designed to provide lending and saving facilities to one-third segment of country's population living below the poverty line. Initially Bank would start operations in 30 districts in the backward areas of the country and its operation will be at full scale in early 2001.

iv) A window is being set-up in the State Bank of Pakistan to regulate micro-financing, as this credit is expected to register considerable expansion with the passage of time.

Several development programs have been started in all parts of the country. These development activities include establishment of educational institutions, construction of access roads to connect rural areas with highways, health facilities, electrification, water supply schemes, sanitation, etc., with initial allocation of Rs. 35 billion for poverty alleviation programs. It is envisaged that half a million jobs will be created. As shown in Table-1, sectoral allocations in Public Sector Development Program 2000-01 have also been substantially increased as compared to the last year.

Table-1: Public Sector Development Program: Sectoral Allocations

(Million rupees)

S.No.	Sector	1999-00 budget	2000-01 budget	% increase
1	Transport and communications	3188	4057	27
2	Rural development	117	2420	1968
3	Health & nutrition	2566	2841	11
4	Social welfare	26	104	300
5	Total	5897	9423	60

Source: Annual Federal Budget, 2000-01.

4. Role of Main Stream Financial Institutions

The extent to which regulated Commercial Banks and the DFIs become successfully involved in micro-finance depends on the policy environment. Government operates targeted micro-finance programs in

which funds are channelled through banks to the borrowers. The banks include Agricultural Development Bank of Pakistan (ADBP), Commercial Banks and Provincial Cooperative Banks. These three institutions also operate in the rural areas through their elaborate network of branches. Of these, ADBP is the largest lending agency to mainly cater credit needs of farming community and to a very limited extent of micro-entrepreneurs out of small allocations made under its special lending programs. Provincial Cooperative Banks through cooperative societies based in the villages, advance small loans to a few micro-entrepreneurs. The involvement of these institutions, however, suffers a number of **limitations** described below:

i) Banks' involvement in the micro-finance programs requires them to lend certain proportion of their loan portfolio to the poor. In many ways the regulatory and prudential framework is more critical for regulated banks than it is for specialised Micro-Finance Institutions where relaxations in the prudential regulations are allowed by the Central Bank.

ii) The practices that most banks use to gain confidence in the quality of loans are expensive. They undertake credit checks to gain information about the client's character, project appraisal to assess the client's business prospects and formal collateral. These techniques cannot be used in micro-enterprises lending. Appraisal of an investment activity whether large or small is too expensive and micro-enterprises also do not keep records. In Pakistan, micro-enterprises have no established credit rating. They also lack marketable collaterals. These factors tend to make DFIs and Commercial Banks to preclude micro-enterprises. A large number of DFIs and Commercial Banks shy away from the small borrowers due to above mentioned factors.

iii) The main-stream lending agencies have to follow the Government policies to make investments in the sectors according to priorities set out in national development plans. National Consultative Council on Credit (NCCC) of State Bank of Pakistan has never given separate allocations to DFIs and CBs to finance micro-enterprises being under-taken by the poor.

The past performance and future potential of the main stream financial institutions is given in the following paras:

4.1 Agricultural Development Bank of Pakistan

The number of impoverished clients comprising land-less and farmers holding upto 2.5 acres served by ADBP under its general lending over last five years has increased from 37 (23+14) thousand in 1995-96 to 65 (13+52) thousand in 1999-00 and their share in total loan portfolio in 1999-00 was 9% (2,263 million rupees out of 24,424 million) as shown in the Table-2 given below:

Table-2: ADBP Agriculture Credit Disbursement (Holding-Wise)

(Cases in thousands) **(Amount in million rupees)**

Year	Land less		Upto 2.50 acres		2.51 acres and above		Total	
	No. of cases	Amount	No. of cases	Amount	No. of cases	Amount	No. of cases	Amount
1999-00	13	459	52	1,804	309	22,160	374	24,424
1998-99	20	985	64	2,430	368	26,757	452	30,171
1997-98	21	2,339	47	1,703	261	18,312	329	22,354
1996-97	12	959	15	729	107	9,957	134	11,644
1995-96	23	1,671	14	742	98	7,841	135	10,254

Source: ADBP Annual Report, 1999-00.

Since 1995, International Fund for Agriculture Development (IFAD), Asian Development Bank (ADB) and Food & Agriculture Organisation (FAO) provided five lines of credit which were executed by the ADBP. These projects were exclusively designed to extend credit facilities to landless rural poor and the small farmers owning upto 1 hectare of land. These projects were implemented in different geographical regions, which had indigenous human skill and the resource potential needed to give impetus to development activities undertaken by the low-income clients through financial assistance made available to them. Poverty reduction in rural Pakistan was one of the priority goals of these projects and their implementation helped in founding a base for further expansion of micro-finance. Within the scope and rationale of these donor assisted programs,

some improvement in access of land-less rural poor and small farmers to formal credit has been brought about. Amount of loans advanced under these micro-finance projects are given in the Table-3 below:

Table-3: Micro-Credit Facilities Provided by International Agencies Through ADBP

(Amount in million rupees)

Name of project	Amount allocated	No. of micro clients served	Loan disbursed	Amount recover-able	Amount Recovered	Recovery %age
FAO Rural Participatory Program (FAO funded)	2.641	1,424	2.641	2.362	2.315	98
Gujranwala Agricultural Development Program (IFAD funded)	271	13,875	212	222	196	88
Punjab Smallholder Dairy Development Project (IFAD funded)	200	5,209	195	189	158	83
2nd Barani Area Development Project (ADB funded)	337	7,563	397	294	247	84
NWFP Barani Area Development Project (ADB funded)	319	9,519	307	250	204	82
Total	1,130	37,590	1,114	957	807	84

Source: ADBP Annual Report, 1999-00.

Experience in lending to resource hunger land-less/small farmers shows that their repayment behavior is much better than larger borrowers. The rates of recovery as evident from the data of Table-3 vary from 82 to 98% which negate the perception of commercial banks that the recovery of loans from micro clients is low.

In addition, ADBP launched three special lending programs from its own resources exclusively to benefit resource deficient small farmers and land-less rural poor. Rate of markup on these schemes varied from 12 to 14%. Total amount of loans disbursed since inception upto June, 2000 to 35.73 thousand entrepreneurs under micro-finance programs was Rs 1,112

million and rate of recovery of such loans ranged from 77 to 90% as shown in the Table-4 given below:

Table-4: Loans Disbursed Under Special Lending Program and their Recovery Ratios (Since Inception)

Name of scheme	No. of beneficiaries (000)	Loans disbursed (million rupees)	Avg. loan per case (rupees)	Amount recovered upto June, 2000 (million rupees)	Recovery rate upto June, 2000 (%age)
Credit to Women (since 1992)	15.47	527	34,090	407	77
Rural Credit Program (since 1987)	18.37	515	28,000	344	90
Small Scale Enterprises (since 1992)	1.89	69	36,678	50	86
Total	35.73	1,112	31,104	801	-

Source: ADBP.

4.2 Regional Development Finance Corporation (RDFC)

Regional Development Finance Corporation advances small loans for micro-enterprises undertaken by the women under their special lending program called "Industrial Credit for Rural Women". The primary thrust of this venture is the economic uplift and financial empowerment of the poor rural women. This scheme was initiated on pilot basis in 1995 in the districts of Attock and Chakwal. The program has now been expanded to include districts of Mingora, Muzaffarabad, D.I. Khan, Rahimyar Khan, Larkana, Khairpur, Skardu and Pashin. The financial assistance provided under the program ranges from Rs 25,000 to 200,000 per enterprise at markup of 14% per annum. Since its inception an amount of Rs 650, 957 has been disbursed in 148 loan cases with average loan size of Rs 4,400 per client. The recovery rate of loans under the scheme is 89%.

4.3 First Women Bank Limited (FWBL)

First Women Bank Ltd. is also providing loans to women under the four schemes namely: (i) Small Loans, (ii) Micro-Credit, (iii) Education Loans and (iv) Loans for Salaried Women. Rate of markup charged is 12-18% depending on size of the loan, which varies from Rs. 10,000 to 50,000 per client. Since inception number of clients served under these schemes as on June 2000 were 14,288 and total loans advanced amounted to Rs. 339 million, average loan amounting to Rs. 23, 745 per client.

5. Role of 0ther Financial Institutions

Provincial Small Industries Corporation/Boards are not allocated funds by the Government but they mostly implement donor assisted credit lines through commercial banks.

Commercial Banks and Small Industries Development Corporation do not advance small loans. The credit provided to the micro-enterprises/small farmers is too inadequate to bring about significant improvement in access of poor to formal credit. [Qureshi and Shah (1992)] The contribution of institutional credit to growth of agriculture was mainly through the financing of lumpy farm investment with big landlords not with the landless/small farmers.

6. Role of Non-Government Organisations (NGOs)

Non-government organisations (NGOs) are engaged in a number of social and economic activities mostly in the rural areas. Exact number of NGOs operating in the country is not known. However, according to National Rural Support Program (NRSP), 5000 NGOs are registered with Corporate Law Authority and many social organizations (SOs) have also been registered with Provincial Social Welfare Departments. As of now combined number of NGOs and SOs is around 50,000. The most significant NGOs which operate under Rural Support Program are (1) National Rural Support Program (NRSP), (2) Punjab Rural Support Program (PRSP), (3)

Sarhad Rural Support Corporation (SRSC) and (4) Balochistan Rural Support Program (BRSP). In nineties, there has been phenomenal increase in number of such organisations ascribing to shift in funding policies of international donors.

Many NGOs besides their involvement in social welfare activities provide credit for income generating micro-enterprises but only as an appendage to their objectives rather than as self-sustained credit programs. These organizations provide small loans to micro-entrepreneurs either out of foreign grants which their sponsors manage to avail from international donors or credit lines from the local banks/DFIs. As an alternate source, Pakistan Poverty Alleviation Fund (PPAF) has been incorporated as a non-profit company. It will act as a wholesaler for micro-enterprise development. The fund will work with local partners, such as non-governmental organizations (NGOs) and community based organizations (CBOs), to provide micro-credit to individuals, and grants and technical assistance to communities for small infrastructure projects like water supply schemes and roads. They charge interest rates ranging from 16 to 24% depending upon size of loans, nature of activities and repayment periods. The loans are generally recoverable within a maximum period of 3 years.

In Pakistan, Agha Khan Rural Support Foundation/Program (AKRSF) has pioneered in introduction of concept of social infrastructure development through NGOs. AKRSF being a community based organisation operates in the Northern Areas, the home of Agha Khanies. Other worth mentioning NGOs are; Asia Foundation, Kashif Foundation, National Rural Support Program, Orangi Pilot Project, Sarhad Rural Support Cooperation, Sindh Agriculture and Forestry Workers Cooperative, South Asia Partnership, Pakistan and Sungi Development Foundation.

Credit provided by National Rural Support Program (NRSP) and Sarhad Rural Support Corporation (SRSC) to micro-entrepreneurs and rates of recovery since inception are given in Table-5 below:

Table-5: Micro-Financing By NRSP and SRSC

(Rupees in million)

	No. of borrowers served (000)	Amount disbursed (Million rupees)	Average loan per client (Rupees)	Amount recoverable (Million rupees)	Amount recovered (Million rupees)	Recovery %age
NRSP	94	1,588	16,860	705	660	94%
SRSC	7	54	7,287	45	43	96%

7. Constrains in Expansion of Micro-Finance

Formal credit institutions are reluctant to diversify and extend their lending operations to new rural poor/small farmers. They look to only walk in clients who in most cases are ex-borrowers. They are hesitant to lend to micro-entrepreneurs for following reasons:

i) Micro loans are not cost affective. Proportionate administration costs on small loans are considerably higher as compared with big loans. The poor are often seen as unreliable clients due to their unstable and small incomes and irregular saving and borrowing. Moreover, achieving predetermined loan targets is much easier through lending to big borrowers. Credit rating of micro-finance is also not established.

ii) Collated credit is as such more secured than non-collated credit. As micro-loans are mostly non-collated, thus there is greater tendency for avoiding such loans.

iii) Attaining the national objective of increased food production is more easily possible through big producers.

iv) There is a perceptible cultural gap between the formal lenders, mostly originating in the urban environment and the rural borrowers who are accustomed to a different way of borrowing money. They also find it difficult to comply with several loan formalities like filling of loan applications, obtaining guarantors, etc. Moreover, information

relating to various credit schemes, formalities, obligations, etc., do not reach them particularly to the illiterates.

v) Various terms and procedures of institutionalised lending are inappropriate to the needs and cash flows of small producers. The flexibilities needed by them for repaying the loan are not built into formal loans. This makes them fearful of the consequences of non-repayment to a formal lender.

vi) Credit from formal lenders is tied to pre-identified production activities, whereas for a small borrower his immediate consumption needs are more pressing than productive investment. Formal lenders, however, view consumption credit as unproductive.

vii) For a micro-entrepreneur, credit from a moneylender although at a high interest rate, is often readily available round the corner in a system to which he has been accustomed for generations.

8. Conclusions and Recommendations

There exists a vast potential for resource mobilization in the rural areas. Commercial banks through their network of rural branches are reportedly mobilising deposits of over Rs. 100 billion per annum but the contributors of these resources are not being benefited. They apparently shy away micro-entrepreneurs/small farmers for fear of default and divert lending to larger industries and commercial/trading activities despite the fact greater proportion of such loan portfolio has become infected. As a result CBs are now afraid of further investments in the above said areas. They have liquidity and are in search of safer investments. Commercial bank's perception of low rate of recovery of loans obtained by the land-less rural poor and small farmers is not correct. Contrarily 90% of total loans of the country are stuck-up in industrial sector where beneficiaries were larger borrowers/elite class. Recent establishment of Micro-Finance Bank is though a commendable step in this direction but it alone may not be able to cater the credit needs of large population of the impoverished. Commercial banks and DFIs having more than 9,000 branches throughout Pakistan, many of which

located in the rural areas, may be involved in micro-enterprises by allocating them mandatory annual credit targets for this purpose.

Treating saving equally important to lending, formal credit institutions may prescribe a certain amount of saving in their bank accounts to qualify for availing credit facilities. Entrepreneurial ability, credit-worthiness and saving may be mandated as essential ingredients for enrolment of the persons as participants of the micro-finance program. For assessment of above attributes, the persons willing to become part of the program should first be enrolled as participants and then borrowers. The participants should be motivated and fully briefed about the program objective and the steps to be taken for its realization, - a way to emerge out of their poverty. The participants may not be advanced any type of loan before 3 months of opening their saving accounts.

Earlier experience of DFIs/banks in financing micro-enterprises indicates that without investment counseling and hands on training of entrepreneurs having low levels of education, and no access to information, most of the money lent under micro-finance will be utilized either for consumption or for traditional activates like livestock, agriculture and small shops/trading. Such a situation will not lead to substantial contribution to GDP in terms of value addition. Hence unguided investment may not generate sufficient revenue for timely repayment of loans necessary for expansion of micro-finance. Viable investment will require lenders to arrange training of the beneficiaries to enhance their vocational skills relevant to enterprises to be undertaken by them.

The overall excitement of development of Micro-Finance Bank on the line of Grameen Bank needs to be looked in its totality. The secret of the success is commitment to job. It is imperative that suitable persons with integrity beyond doubt and willing to accept the challenge by foregoing their personal desires may be assigned this job. The working of main stream DFIs/banks is marred with inefficiencies and bureaucratic attitudes and their staff is attuned to look to walk-in clients and that too with implied consideration. They process loan requests for traditional activities and are generally reluctant to brain-storm needed for appraisal of new enterprises. To improve and make micro-finance programme successful in poverty

alleviation a number of more specific recommendations are made in the following.

i) It should be made compulsory for credit institutions to impart training to the micro enterprises. Till such time credit institutions develop their own training facilities, assistance of the existing training institutions and organizations like Poly Trade Institutes, SMEDA, ABAD etc., may be sought.

ii) To keep administration cost low, the formal lenders including Micro-Finance Bank have to adopt quick and simple lending procedures such as decentralized loan approvals, minimum documentation, and use of social collaterals (individual/group guarantees) in place of tangible collaterals on the lines of Bank Rakyat of Indonesia and Grameen Bank of Bangladesh.

iii) To ensure high repayment rate, the lenders have to develop a range of techniques including peer pressure, contact intensification, investment counselling and frequent follow-up for recovery specially during the periods when incomes are received.

iv) Prudential regulations of the State Bank of Pakistan applicable to normal lending procedures/policies may be relaxed so that Micro-Finance could be operated with limited regulatory cover.

v) Basic development strategy recommended for reducing poverty is labor-intensive growth and broad provision of social services. The lending agencies should, therefore, coordinate with Pakistan Poverty Alleviation Fund for simultaneous development of social infrastructure in areas of their operation as complementary to their efforts.

vi) Micro-Finance Bank and the main steam credit institutions may have to re-design micro-finance products suited to peculiar requirements of the low income groups in terms of size of loans, assets owned, income consumption requirements, flexibility in repayment period, etc.

vii) Diversification in lending will have to be achieved in order to minimize lender's risk as well as increase income of the micro-entrepreneurs.

viii) To ensure substantial contribution to GDP, separate lending targets for economic opportunities envisaging value addition and for the traditional ones may be given.

ix) Responsibility to ensure the recovery of credit should be put jointly on all the creditors and mark-up on loans linked to timely repayment of loan installments from the creditors of the area.

x) NGOs seeking linkage of their clients with the formal lenders may be formally involved in credit operations by asking them to furnish personal guarantees to secure loans/advances to their recommendees. This would ensure people's participation in credit delivery system and recovery of loans.

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WATER RESOURCES DEVELOPMENT AND MANAGEMENT: PAKISTAN'S VISION

By
Muhammad Afzal*

And out of water every thing made alive. See! If it should turn out brackish or it dries up on the marrow, who will then bring you fresh flowing water?

"The shortfall in water availability is likely to reach 107 MAF in 2013 and 150 MAF by 2025. What to speak of the year 2025, shortfall of even 40 MAF in the year 2000 is not possible to meet. There will be NO WATER to meet future requirements even if full residual potential were developed by any magic WAND. Water logging and salinity are on top of sustainability issues. Consequently, some 30 million Pakistanis might remain without food in the new millennium. Food scarcity could create famine-like conditions in the country and spell disaster worse than any ever faced by the country. The government would be forced to import besides edible oils, large quantities of other agricultural commodities. With growing external debt, poor foreign and internal financial resources, and inadequate industrial base, it might become too much of a burden to foot the rising import bill. It is, therefore, high time to promote public awareness of the issues and options for development, management and utilisation of water resources in Pakistan.

1. Introduction

Pakistan's agriculture is almost wholly dependent on irrigation because climate in most areas is arid to semi-arid with rainfall not more than

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150 mm and evaporation ranging from 1,250 mm to 2,800 mm per annum. Precipitation over the Indus Plains and Peshawar valley contributes only 40 MAF. However, there are abundant surface water resources derived from the Himalayan watershed of about 400,000 sq.kms with numerous glaciers feeding the Indus River System. On the average, over 140 MAF water flows annually in this System. Efficient management of these resources is a key element for the development of agriculture in Pakistan. Keeping in view the food grain and foreign exchange requirements, 6 percent per annum rate of agriculture growth is equired. To achieve this rate, it is imperative to enhance crop production and productivity through a considerable change in production system particularly in irrigation management. The Water Sector in Pakistan is at a critical juncture. The adverse environmental effects of waterlogging, salinity, and mining of ground water are threatening the resource base of irrigated agriculture. Growth of total factor productivity in agriculture, strongly influenced by irrigation, is also declining. This situation requires new solutions to maintain the resource base, improve agricultural productivity and sustain irrigated agriculture in Pakistan. This paper reviews current availability and future potential and requirements of water for agricultural and non agricultural uses alongwith long-term water vision for Pakistan

2. Surface Water Development and Potential

The flow of the Indus River and its tributaries constitutes the main source of surface water for the country. Inflow to the Indus River System (IRS) is derived from snow, glacier melt and rainfall, primarily upstream of the Indus plains. Under the Indus Waters Treaty, 1960, the flow of three eastern rivers, the Sutlej, Beas and Ravi, have been allocated to India. Water from the three western rivers, the Indus, Jhelum and Chenab is available to Pakistan. Based on 75 years of historic data, from 1922/23 to 1996/97, the average annual inflow of the western rivers at the rim stations amount to 139.62 million acre feet (MAF). The flow varies from year to year; the maximum was 186.79 MAF (36% above average) in 1959-60 and the minimum, 100.31 MAF (26.9% below average) in 1974-75. The flow varies markedly during the Kharif and Rabi seasons also. Kharif inflows average 115.18 MAF or over five times the Rabi inflows of 22.06 MAF.

During the decade ending 1979-80, the canal head withdrawals had increased to an average of 104 MAF against 64 MAF at the time of Independence. This increase is attributable to the storage reservoirs of Mangla, Chashma and Tarbela which became operational in 1967, 1971 and 1976 respectively, coupled with several diversion barrages built on the river system.The storage releases of Mangla and Chashma average 5 MAF and with the addition of Tarbela, it went upto 15 MAF. However, the storage releases from the reservoirs have come down to around 12 MAF due to sedimentation. While bulk of the storage supplies are utilized during the Rabi, they have also been available in the critically water scarce periods of late Rabi and early Kharif for the sowing and maturing of crops.

To harness this resource, 3 major reservoirs, 19 barrages, 12 link canals, 61,000 km long irrigation canals, 1.6 million km of watercourses and 16,000 km of surface drains have been constructed. In addition, there are over 450,000 public and private tubewells to tap the subsurface water available in the basin. We fondly refer to this system as "The Indus Food Machine".

Out of 35 - 40 MAF flowing to the sea, a total of about 25 - 30 MAF can be used for future development through construction of multipurpose storages, remodelling of canals and irrigation extension schemes.

Storage facilities require huge investment and long gestation periods and importantly a political consensus. The storage dams even if started today, will not be ready by the year 2010 to deliver the needed water to the system. The possible alternatives to surface storage facilities are groundwater, watercourse improvement, canal lining and riverine area development.

About 2.2 million hectares of irrigated land is outside Indus Canal Commanded Area (CCA), scattered in relatively small parcels with water derived from open wells, tubewells, karezes, springs, and small diversions. Generally, water supply in these systems is uncertain and varies with season and location.

3. Groundwater Development and Potential

Most of the Indus Basin has been formed as a result of alluvial deposits brought by rivers from the mountain ranges in the north. There is a vast unconfined aquifer of around 6 million hectares covering most of this area. The hydrogeological conditions are mostly favourable for pumping by tubewells.

Groundwater quality is variable with about 79 percent of area in Punjab and 28 percent of area in Sindh as fresh groundwater suitable for irrigation. By the 1950's large area in the Indus Basin became waterlogged and soil salinity increased, adversely affecting the agricultural productivity. Government involvement in the groundwater development began with efforts to control the "twin menace" of waterlogging and salinity by providing drainage. The Government embarked on a series of SCARPs in the late 1950's aimed at lowering the groundwater table providing "vertical drainage" through large capacity/deep tubewells. Because of better economic returns, priority was given to locating SCARPs in the area with groundwater quality suitable for supplemental irrigation, making the drainage a major beneficiary in the process. Over the last three decades about 13,500 SCARP tubewells have been so far installed by the Government in 36 projects covering a gross area of about 3.7 million hectares.

The introduction of tubewell technology by the public sector was followed by a virtual explosion in the private tubewells development. Currently there are over 450,000 private tubewells installed for irrigation purposes.

As a consequence of such development, the groundwater pumpage in the Indus Basin has increased from 3.34 MAF in 1959-60 to 48.00 MAF in 1996-97, 38 MAF from private and 10 MAF from public tubewells. The estimated usable ground-water potential is about 54 MAF. This leaves about 6 MAF which remains to be exploited. An additional potential of about 10 MAF has been estimated in riverine areas. The annual groundwater potential of areas outside the Indus Basin is estimated at 1.41 MAF. The progrmmes to utilize these resources need to be developed.

4. Sustainability Issues

The sustainability of irrigated agriculture is being threatened due to the following issues.

i) Waterlogging and Salinity
ii) Secondary Salinity
iii) Inequity in Water Distribution
iv) O&M of Irrigation and Drainage System
v) Environmental Hazard in Irrigation and Drainage
vi) Reservoir Sedimentation
vii) Salt Balance
viii) Saline Effluent Disposal
ix) Water Delivery Efficiencies
x) Environmental Protection
xi) Water Pricing & Water Markets
    (a) Evolution of Water Charges
    (b) Future Perspective
    (c) Water Markets
xii) Institutional Aspects

5. Long Term Water Vision - 2025

5.1 Vision for Pakistan

The initiatives launched in Eighth Five Year Plan to liberalize the economy need to be pursued as well in the long term water vision. The readjustments in economic management include privatization, decontrol, deregulation, liberalization, market orientation, community participation and physical environment conservation. These initiatives will alter the nature of planning. In contrast to earlier approaches, which saw the government as the main vehicle for economic change, the new approaches view the government as a catalyst, a manager and a motivator. The objective of policy is no longer what the government could accomplish on its own, but how it could induce other economic agents to act in concert for the pursuit of the collective interest. These agents include business managers, workers, investors (both

local and foreign), NGOs and common households. Inducing them requires the use of economic incentives, institutions for engendering cooperation, training and skill development, monitoring, information dissemination, provision of infrastructure, proper maintenance of assets, stability of systems and policy, and the removal of obstacles. The exercise of economic planning should help the government step into its new role. This transformation marks a shift from allocative planning to indicative planning and from direct intervention to market signals. Efforts need to be made not only to attain self-sufficiency in production of the food grains, but also generate exportable surpluses through optimal utilization, development and effective management of water resources.

Pakistan's water resources are not only finite but also exhaustible. Development of additional storage facilities will improve water availability but only in the short run. The major future challenge is attaining food self-sufficiency on an environmentally sustainable basis. Without the requisite water supply, food and fiber deficits will be irrecoverable. The shortfalls in water availability compared to requirement are expected to be about 40, 107 and 151 MAF in the years 2000, 2013 and 2025 respectively, causing food, fiber and edible oil shortfalls. These shortfalls may increase to 39.0 million tonnes in year 2025.

The causes of the poor performance of the irrigation and drainage sub-sector are not merely financial, but also include failures of policy and irrigation and drainage institutions. Taking into consideration the above issues and challenges, further exploitation of surface and groundwater potential, implementation of water conservation programmes and extension services, and revision of water rates to bridge the gap between O&M costs and recoveries, have also been advocated as possible solutions to the problems facing this sector.

The Government of Pakistan and the World Bank have jointly conceived the National Drainage Programme (NDP) as the first phase of a 25 year. Drainage Programme with significant emphasis on policy and institutional reforms to assure the sustainability of the subsequent long term investment programme comprises various sub-components, including Planning and Research Studies. This sub-component will support a number

of complementary policy initiatives and reforms in the Water Sector to improve project planning, integrate research findings, improve capital cost investment, O&M and water management policies, etc. The policy initiatives would be supported by a number of important policy studies already agreed between the Bank and GOP, including preparation of a National Water Policy to establish a coherent policy, institutional and possibly legal framework for effective regulation and development of water resources.

5.2 Proposed objectives

The major goal of policy and planning in the water sector will continue to be that of uplifting the agro-based economy of the country by maximizing crop production. This goal will be accomplished through:

- Progressively increasing surface water supplies.
- Replacing public tubewells with private ones.
- Improving existing management practices including water quality management.
- Protecting land and infrastructure from waterlogging, salinity and floods.
- Conservation of available water resources through optimization of water conveyance and application efficiency, use of new technology such as drip, sprinklers and buried pipes.
- Judicious application of water and non-water inputs to maximize production per unit volume of water used.
- Development of institutions for the training and development of human resources related to water resources of Pakistan.

5.3 Projected food production and requirements

The targeted per capita availability of major food items and export requirements used for computation of agriculture production have been

adopted from reports of Water Sector Investment Planning Study (WSIP), National Commission on Agriculture (NCA) and Planning Commission.

The future agricultural production have been adopted from WSIPS. The projections assume a continuation of past trends in future investments in the Water Sector and some growth in cropped area due to the gradual uptake of the full potential of past investments. Under this scenario, there are large deficits of food, fibre and edible oils over the entire period of perspective plan. A significant shortfalls in food grains, oilseeds, sugarcane and cotton lint for the year 2013 and 2025 are foreseen. Central to the problem, however is enhancing agricultural productivity by ensuring additional water supplies and its efficient management and utilization.

5.4 Water requirements and availability

The water resources of Pakistan come to 140 million acre feet. Due to continuing rise in the population of the country, availability of water resource per capita is getting short day by day. From a water effluent country at the time of Independence having about 5,000 cubic meter of water per capita, water availability in Pakistan has now decreased to about 1,200 cubic meter. In fact, shortages of water for domestic and industrial use are already being felt in Islamabad, Karachi and many other places. The situation can become worse in a matter of a decade due to growing need of water for domestic, industrial and agricultural use. It is a tragedy that at a time before 1947, it was the bread-basket of the sub-continent. After 50 years, our annual imports of wheat, edible oil, milk and pulses have crossed a colossal figure of about one billion dollars. Large tracts of irrigated lands are in a state of decay and ruination by salinization and rise of groundwater table to dangerous levels due to poor regulation, application and management of water. The poor disposal of sewerage water from urban settlements and of the dangerous industrial effluent into our rivers, drains and canals is posing a serious threat to the health of the irrigated lands and the population.

Irrigation is the largest user of water. Irrigation demand will be mainly determined by agricultural requirements to meet food and fibre needs of the people and for exportable crops to earn foreign exchange.

Without requisite water supply, food and fibre deficits would be inevitable. The shortfalls in water availability is likely to reach 107 and 150 MAF in the years 2013 and 2025. The deficit of 107 MAF in year 2013 would exceed current total canal withdrawals of 106.4 MAF. What to speak of the year 2025, shortfall of even 40.3 MAF in the yer 2000 is not possible to meet (Table 1).

Table-1: Water Requirements and Availability

Year	2000	2013	2025
Water Requirement*			
Irrigation	143.1	206.4	
Non-irrigation	5.9	8.7	
Total requirements	149.0	215.1	277.4**
Water Availability*			
Total surface and groundwater	108.7	107.3	126.6
Shortfall	40.3	107.8	150.8

Source: Water Sector Investment Planning Study (WSIPS) 1990.
* At Watercourse head.
** Extrapolated.

In short, there will be NO WATER to meet future requirements even if full residual potential were developed by any magic WAND. Consequently, some 30 million Pakistanis might remain without food while entering the new millenium. This could spell disaster worse than any ever faced by the country. The government would be forced to import besides edible oils, large quantities of other agricultural commodities. With growing external debt, poor foreign and internal financial resources, and inadequate industrial base, it might become too much of a burden to foot the rising import bill. Food scarcity could create famine-like conditions in the country.

We have large summer surpluses in our rivers for a short period of 80 to 120 days but they are not being profitably utilized. By conserving the surplus river supplies, the irrigated land base can be expanded by about 12 million acres of new lands in the most backward areas in all provinces. Extension and improvement of irrigation would make Pakistan not only self sufficient in food, pulses and edible oils, but also greatly boost our agriculture based exports.

A number of storages are required to make optimum use of our precious river waters. Storages would enable effective flood control of rivers in dry and wet cycles, and substantial increase and improvement of canal water availability from the existing level of 104 MAF to nearly 130 MAF. It would enable substantial hydro-power generation upto 30,000 MW. Controlled and improved flows in the Indus would make it an excellent all-weather waterway from the sea to as far as Kalabagh and Attock, specially for moving such bulk cargo as wheat, cotton, steel, oil and coal. It is, therefore, high time to promote public awareness of issues and options for the development, management and utilization of water resources in Pakistan.

5.5 Development potential

Out of 35 - 40 MAF flowing to sea a meagre potential of about 25 - 30 MAF is left for development of surface water resources through construction of multipurpose storages, remodeling of canals and irrigation extension schemes. Groundwater residual potential of 7.4 MAF remains to be exploited. So overall remaining water potential both surface and sub surface resources would be in the range of 33 - 38 MAF against additional requirement of 40.3 MAF in the year 2000 and 107 MAF in the year 2013 respectively. In nutshell, it will not be possible to meet full future requirements even if full residual potential are developed by any magic wand.

Three storage reservoirs were added to Indus Basin Irrigation System (IBIS) during 1967-74 as part of the Indus Basin Project. Due to sizeable sediment inflows in the river water all these storages are losing their

capacities. Progressively emerging capacity loss picture, based on conservative projections, is summarized in Table 2.

Table-2: Capacity Loss of On-Line Storage Reservoirs

Reservoir	Year of Commissioning	Live Storage Capacity							
		Initial		Current 1997		Year 2000		Year 2010	
		Bm^3	MAF	Bm^3	MAF	Bm^3	MAF	Bm^3	MAF
Mangla	1967	6.5	5.3	5.7	4.6	5.5	4.5	5.2	4.2
Chashma	1971	0.9	0.7	0.5	0.4	0.4	0.3	0.2	0.2
Terbela	1974	11.9	9.7	10.0	8.2	9.8	8.0	7.3	7.3
Total		19.3	15.7	16.2	13.2	15.7	12.8	14.4	11.7

Source: Tarar (1997)

Table 2 shows that by the year 2010, these on-line storages would have lost the live capacity of about 4.9 Bm3 (4.0 MAF) i.e. 25 per cent of designed capacity. In fact, due to the capacity loss so far, IBIS canal diversions have started declining. Thus it can be very well appreciated that it is no longer possible for Pakistan to sustain the existing level of canal diversions attained in the post-Tarbela period.

6. National Targets and Priorities

The irrigation sub-sector envisages construction of new canals, rehabilitation/remodelling/lining of the existing irrigation network, construction of small irrigation schemes like delay action dams, infiltration galleries and diversion weirs so as to provide additional irrigation water on the one hand and to mitigate waterlogging in the affected areas on the other. The fresh groundwater is to be developed by the private sector through installation of fractional tubewells from their own resources.

It is expected that with the completion of storage dams, small irrigation schemes and installation of tubewells in fresh groundwater and riverain areas and improvement of watercourses, an additional 26 MAF of irrigation water will be made available at the end of the plan.

While entering 21st century, IBIS of Pakistan would need additional live storage capacity of about 8 Bm^3 (6.6 MAF), to compensate for current

loss of about 3.7 Bm^3 (3 MAF) of on-line storage and 4.4 Bm^3 (3.6 MAF) to provide additional provincial allocations under WAA. In addition would be the desirability of injecting a large chunk of relatively cheap public sector hydropower to keep the energy within affordability of consumers. To cope with this situation, the only option would be to urgently embark upon a major multi-purpose storage project. (In fact, it should have been taken up already to become handy around the year 2000).

6.1 Short-term

Short-term objectives and priorities are to accelerate the pace of implementation of ongoing projects, protect borderline waterlogged areas through preventive measures, limit public sector investment in subsurface drainage to SGW areas and strengthen the linkages between drainage research and development. Other short-term objectives and priorities held in common with the irrigation subsections are; (a) to increase the role of the private sector in development and maintenance of water sector infrastructure; (b) pilot test the concept of autonomous organizations for operation and maintenance (O&M); and (c) intensify post-completion monitoring and evaluation.

6.2 Long-term

For the purpose of objectives for Vision 2025 in respect of drainage a long term plan has been conceived in the shape of Phase-I, II & III that would be implemented through the 9th, 10th, 11th and 12th Plan Periods of the National Drainage Programme. Phase-II of NDP will start from the year 2004 and complete in the year 2010. Phase-III will be completed in Year 2020.

For the long term, the new strategy for drainage emphasizes measures to (i) reducing the drainable surplus through improved water management, (ii) reducing or intercepting seepage at source and biological drainage, and (iii) exploiting the residual potential of adversely affected resources, by such means as saline agriculture. These objectives reflect the recommendations of the National Conservation Strategy adopted in 1992. To control waterlogging

and salinity, the strategy advocates an integrated drainage approach, i.e. a combination of, among other things, intensive cropping and tree planting, promotion of salt-tolerant crops and cropping systems, provision of gypsum for salt-affected areas (Gypsum is a soil amendment that facilitates the reclamation of certain salt affected soils), installation of tubewells, construction of surface drains by farmers and provision of subsurface drainage for selected areas. The National Conservation Strategy also highlights the urgency of implementing a Wetlands Management Plan. Objectives to be achieved through Vision 2025 are:

i) To control ground water table.
ii) Rehabilitation and improvement of Surface Drainage System.
iii) Dispose off salts from the basin to sea.
iv) Develop and implement programmes for use of brackish drainage water.
v) Minimize drainable surplus through improved water management practices.
vi) Adopt biological drainage in an area of 100,000 acres.
vii) Strengthen participatory irrigation and drainage management.
viii) Implement schemes of information, education and communication for the benefit of farmers, professionals and policy makers.
ix) Under "On-Farm Water Management Programme", 63,000 WUA would be organized and about 60,000 watercourses will be renovated by the end of Perspective Plan. About 220,000 hectares would be developed and precisely leveled. Similarly, other activities like farmers' training and physical works etc., would continue to improve water use efficiency.

Crop targets for Perspective Plan which emerge from the proposed strategy incorporate:

i) Self-sufficiency for food grains based on demand projections,
ii) Maximizing agricultural exports based on an assessment of export possibilities and potential barriers to Pakistan's agricultural exports,
iii) Maintaining self-sufficiency in sugar and oilseeds production,

iv) Increase in the irrigation water supplies, and
v) Productivity increases commensurate with the modest increases in the inputs.

6.3 Financial outlay

Total outlay for Water Sector Projects comprising Irrigation, Drainage and Reclamation, Flood Control, Research, On-Farm Water Management, Planning and Investigation etc., during the Vision 2025 amounts to Rs 1,248 billion. The total demand for Irrigation is proposed to the magnitude of Rs 967 billion, next ranks Drainage and Reclamation component with allocation of Rs 145 billion, followed by OFWM with financial outlay of Rs 66 billion, Flood Control amounting to Rs 58 billion and Research to Rs 12 billion.

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IMPACT OF VARIOUS INPUTS ON PRODUCTIVITY OF POTATOES:

By
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and
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"Potato is an important vegetable crop of the country. Its consumption is widespread and increasing both in the urban and rural areas. However, the growth in its productivity is seriously constrained due to lack of proper knowledge/technology for using the available resources to maximize the returns. Based on the micro data of 240 sample farmers randomly selected from the main potato growing areas of the Punjab, this study has analysed the pattern of productivity of various factors/inputs in potato farming. The factor productivity estimates are derived by estimating an extended form of the Cobb-Douglas production function. Important factors/inputs having significant role in potato production are sowing expenses, farmyard manure, chemical fertilizers, pesticides and weedicides. On the whole, the potato crop has been operating under the law of increasing returns as the total(1.4) of all elasticities exceeds unity.

Potato crop has the potential to meet the challenge of food self-sufficiency, provided it is acknowledged as food crop

Introduction

Pakistan is facing a rapid population growth which is not matched by a similar growth in the production of food crops leading to widening gap

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between total demand and supply and ever growing imports. Given the limited resources, especially the cultivable land and water, the enhancement of the production is possible mainly through increasing the productivity instead of increasing area under cultivation. Government is struggling to enhance the productivity of crops through various measures that can lead to adoption of improved and efficient technology. The traditional technology still used by various farmers has to be replaced by efficient production methods.

The objective of this paper is to measure and analyse the factors affecting productivity of various inputs in the production of potatoes. In particular, the focus has been laid on the relative importance of various types of fertilizers, expenses incurred on sowing, application of weedicides and pesticides in raising potato yield. The study is based on a comprehensive survey of 240 farmers in the main potato growing areas of the Punjab including Kasur, Lahore, Okara, Pak-pattan, Sahiwal, Sheikhpura and Sialkot districts[(a)]. The survey was conducted in 1997 under the Kitchen Crops Project[(b)]. The sample includes small as well as large farmers. The percentages of small, medium and large farms included in the sample are 67.5, 16.7 and 15.8 respectively[(c)].

2. Methodology

The main focus of the study is to analyse the impact of various inputs on the productivity of 'autumn crop' of potatoes. To estimate the impact of various factors on productivity there are more than one methods like estimations of cost or profit functions and the associated input demand function. This dual approach can be preferred purely on econometric grounds but it has a number of serious limitations. For example, in the cost function approach it is assumed that the farmers are technically efficient and

(a) The Selection of villages and growers was based on stratified random sampling.

(b) APCom component of Increasing Productivity of Kitchen Crops, a development project of MINFAL.

(c) The farm sizes upto 12.5 acres, 12.5 to 25 acres and above 25 acres are respectively classified as small, medium and large farms.

they are free to produce the desired level of output without any financial or market related constraints. This assumption is obviously not realistic because of the limited access of farmers, especially the small ones, to financial markets and also the poor information network available to them. Also the profit function approach assumes that the farmers are free to choose the desired level of inputs to produce the optimal level of output. It is again assumed that farmers are technically efficient and they have free access to markets. It may further be noted that in the profit function approach it is necessary to specify the product and input market structure in which farmers operate.

Keeping in view these limitations, the production function technique has been used in this study. The production function considered is basically of the Cobb-Douglas type which in linear form is given below:

$$\ln Y = \beta_0 + \beta_1 \ln S + \beta_2 \ln M + \beta_3 \ln N + \beta_4 \ln P + \beta_5 \ln K + \beta_6 \ln T + \beta_7 \ln W + \mu \quad (1)$$

Where

Y	=	Yield of potatoes in kgs per acre.
S	=	Expenses on sowing operations in rupees per acre.
M	=	Farmyard manure in kgs per acre.
N	=	Nitrogen in kgs per acre
P	=	Phosphorus in kgs per acre
K	=	Potash in kgs per acre
T	=	Expenses on pesticides in rupees per acre
W	=	Expenses on weedicides in rupees per acre
μ	=	error term

All variables have been measured in per acre term in order to avoid the possible incidence of heteroscedasticity. The Cobb-Douglas form has a limitation that the productivity of an input as measured by the elasticity of output with respect to that input remains constant at all levels of output and for all input proportions. Although this assumption does not contradict with the law of diminishing marginal products, it still limits marginal products positive. It is well known that the excessive use of certain inputs can damage

the crop, thereby resulting in negative marginal product. Thus, for all such inputs where marginal product can vary considerably, the extended production function allow the elasticity parameter βi to be a linear function of the corresponding input. With this generalization the production function (1) is extended as follows:

$$\ln Y = \beta_0 + \beta_1 \ln S + \beta_2 (\ln S)^2 + \beta_3 \ln M + \beta_4 (\ln M)^2 + \beta_5 \ln N + \beta_6 (\ln N)^2 + \beta_7 \ln P + \beta_8 (\ln P)^2 + \beta_9 \ln K + \beta_{10} (\ln K)^2 + \beta_{11} \ln T + \beta_{12} (\ln T)^2 + \beta_{13} \ln W + \beta_{14} (\ln W)^2 + \mu \quad (2)$$

It is to be noted that in the actual estimation of the above specification, squared terms have been included only for those inputs where the elasticity varies considerably with their use. The above production function is estimated by OLS method using the sample data of 240 farmers.

3. Results

The results of analysis are presented in Table-1. As can be seen from the value of R^2 (0.52) the overall performance of estimated equation is reasonably good. Despite a large sample and cross section data the model explains the half of variation in potato yield. With only one exception (Nitrogen), all the parameter estimates are statistically significant. Even the insignificant parameter can not be relegated as irrelevant because its **t**-value is greater than one. The results show that the sowing expenses have significant and positive effect on productivity. The corresponding elasticity of 0.263 means that 1 per cent increase in sowing expenses results in 0.263 per cent increase in yield or 10 per cent increase in sowing expenses raises the yield by 2.63 per cent. The elasticity estimates of farmyard manure is relatively low, though, it is also statistically significant. This is because of its residual affects -- all the benefits of its application can not be utilized by potato crop. The estimated elasticity shows that 10 per cent increase in the use of farmyard manure results in 1 per cent increase in productivity.

Table-1: Parameters Estimates of the Production Function

Variable	Parameter estimate	95% confidence interval for β	
		Lower bound	Upper bound
Intercept	4.061 (4.247)*	2.177	5.945
S	0.263 (2.401)**	0.047	0.478
M	0.101 (8.787)*	0.078	0.123
N	0.284 (1.442)	-0.104	0.673
P	0.263 (3.800)*	0.127	0.400
K	0.269 (11.772)*	0.224	0.314
T	0.099 (3.160)*	0.037	0.161
W	0.224 (2.678)*	0.059	0.388
N^2	-0.048 (2.230)**	-0.090	-0.006
W^2	-0.040 (2.939)*	-0.067	-0.013
R^2 = 0.52			
F. Statistics = 27.66*			

Note: The t statistics are given in parentheses. The statistics significant at 1% and 5% levels are indicated by * and ** respectively.

The output elasticities with respect to chemical fertilizers are quite large. The elasticity estimates of nitrogen decreases significantly with the increase in its use, while the elasticity of other two types of fertilizers i.e. phosphorus and potash remains constant.

It has further been observed from the regression estimates that the elasticity of output with respect to expenditure on pesticides is positive and

statistically significant. The estimate is, however low, about 0.1 per cent. This could be attributed to the fact that some of potato growers spray the crop with fungicide/pesticide before the occurrence of disease as a precautionary measure while others spray the crop after the appearance of disease symptoms. Finally, the elasticity of output with respect to the expenditure on weedicides is significant and sufficiently large (0.224). It is initially positive and continues to decline with the increase in expenditure.

It may further be noted that potato crop cultivation is under the law of increasing returns as the total of all inputs/factors elasticities (1.4) is greater than one, showing that with the increase of one per cent input use on the whole, productivity per acre goes up by 1.4 per cent.

The last two columns of the table show the lower and upper bounds for the parameter estimates under the 95 per cent confidence interval. The results show that except for one case there is no reversal of sign for parameter estimates between upper and lower bounds. In other words there are at least 95 per cent chances that if we move from sample to sample the positive elasticity will remain positive while the negative elasticities will remain negative. This robustness points to a high level credibility of results.

The results further indicate the importance of expenses on sowing, weedicides and chemical fertilizers in raising the yield of potato crop. Farmyard manure is an organic fertilizer and because of its low content of N, P and K and limited availability it can not completely substitute chemical fertilizer. However, the excessive use of nitrogen practiced by growers has been found to have an adverse affect on yield. Therefore, it is essential to inform the farmers about the balanced proportions of chemical fertilizers. The excessive use of N is unfortunately common because of low prices of urea compared to DAP - the commonly available phosphatic fertilizer which also contain high proportion of nitrogen. The results also show that potash is quite productive type of fertilizer among all the four types considered in the study. On the other hand, the use of potash is found to be least common among potato growers. This is again mainly because of farmer's tendency to use popular fertilizer for almost all types of crops. Thus, the farmers need to be educated rigorously for adoption of other types of fertilizers that contains smaller proportion of N and high proportion of potash. These types

of fertilizers need to be made available and popularized in potato growing areas.

The excessive use of weedicides on the one hand increases the cost while on the other hand it affects the physiology of the plant, thereby lowering the yield. The farmers, therefore, need to be educated about the hazard involved in the excessive use of weedicides.

5. Conclusion

This study has analysed the pattern of productivity of various inputs in the production of potatoes. The study is based on a sample of 240 farmers in the main potato growing areas of the Punjab. The factor productivity estimates are derived by estimating an extended form of Cobb-Douglas production function. The main findings are summarized below:

i) Use of chemical fertilizers namely phosphorous and potash and expenditures on sowing operations are the most important inputs for enhancing potato yield.

ii) Excessive use of nitrogen and weedicides on potato crop do reduce its yield per acre.

iii) Current use of fertilizer is not efficient one, because farmers are not using the recommended doses of N, P and K in potato cultivation. It is, therefore, important to educate the farmers about the mix of fertilizers that are more appropriate for the crop.

iv) To discourage the prevailing tendency, blended fertilizers containing N, P and K in desired ratios need to be prepared and introduced to improve the efficiency of fertilizer on potato and other crops.

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COMPARATIVE ECONOMICS OF COMPETING CROPS IN PAKISTAN

By

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"Resource allocation by the farmers among the competing crops is primarily governed by economic considerations. The economic indicators like output-input ratio, and returns to purchased inputs, crop duration and irrigation water have been analysed to study the comparative economics of competing crops. This analysis has been done exclusively from the growers' point of view who allocate resources considering the peculiar situation at a given point of time. Their decision may or may not be in line with the Nations' point of view. Therefore, it may differ from the social profitability analysis. In view of the annual price fluctuations in the crop sector, the 3-year average of 1987-88 to 1989-90, and 1997-98 to 1999-00 has been taken for the analysis. In the Punjab, cotton has maintained its superior position over basmati and Irri paddy overtime. Sunflower has also maintained its edge over wheat in terms of most of the economic indicators. The relative profitability of cotton + sunflower has slightly lowered. The economic position of basmati + wheat has declined overtime, while that of sugarcane marginally improved in Punjab. In Sindh, the economics of cotton has slightly improved over Irri paddy. Sunflower has retained its profitable position over wheat. Sugarcane has marginally lost overtime, while sunflower combinations slightly improved".

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1. Introduction

The resource allocation by farmers among the competing crops is, inter alia, governed by a number of economic factors like gross cost, cash expenses, gross margins, net income, output-input ratio and revenue per day of crop duration and per acre inch of irrigation water. The estimation of these indicators may provide some useful insights to the policy makers about the behaviour of growers in selecting the alternative crops and help them to design policies which ultimately encourage the resource allocation in the desired direction at the national level.

Among the rabi crops cultivated in irrigated regions, spring-planted sunflower, maize and rabi fodders primarily compete with wheat for land, water and other resources. The analysis of rabi crops is confined to wheat and spring sunflower for want of requisite data on maize and rabi fodders. Gram, rapeseed and mustard are also important rabi crops. But in view of their low water requirements and pre-dominant cultivation in the rainfed regions, these crops may not pose direct challenge to wheat crop in the irrigated parts of the country where the bulk of wheat production and marketable surplus is obtained from. For want of data, the analysis is limited to the Punjab and Sindh.

Among the kharif crops, cotton and rice may directly compete with each other provided the ecological conditions permit their cultivation in a given location, as is the case in certain areas of the Punjab and Sindh. The competition for land, water and other farm resources would also arise within rice varieties of basmati and Irri where both can be technically grown side by side in the same region.

Sugarcane, the annual crop, occupies land round the year and competes for land, water and other farm resources with all the kharif and rabi crops as the land planted to sugarcane would not be available for growing other crops at least for a year as the crop is also ratooned. However, the combination of kharif and rabi crops would have to be considered in this comparative analysis. The relevant combinations would be cotton+wheat, rice+wheat, cotton+sunflower and rice+sunflower.

It may be cautioned that these indicators may sometimes provide conflicting signals. Accordingly, the resource allocation attitude of a farmer at a given point of time may be influenced by his own peculiar situation. The above economic indicators are generally analysed from the farm management and input-output prices data which are subject to change over time and thus affect the comparative economics of the competing crops. In addition, any change in the price and yield of a competing crop would alter its relative profitability from the farmers' point of view. Therefore, these limitations should be kept in view while interpreting the results of such analysis.

2. Nature of Data

In the wake of annual price fluctuations experienced in the crop sector, the economic analysis of a single year may not represent the true situation. Therefore, the 3-year average of 1987-88 to 1989-90, and 1997-98 to 1999-00 has been taken for estimating the changes in the comparative economics of competing crops overtime. The subject material, economic indicators and data set have been adopted from the respective Support Price Policy papers by the Agricultural Prices Commission, Islamabad. The period of 1987-88 to 1989-90 was the beginning time when the government allowed the private sector to play its role in marketing of crop output in the late 1980's. The other span (1997-98 to 1999-00) is the period when a decade of private sector involvement in marketing of farm produce had passed. During the 1987-88 to 1989-90, the private sector was although allowed in agriculture marketing but the support price implementation was not as poor as observed during the end of the current decade when the private sector has been the major price taker. In the wake of increasing role of private sector in the economy, most of the farm commodities have been disposed in the open market during 1997-98 to 1999-00.

In this paper, the comparative economics of competing crops like sugarcane, cotton, rice alongwith the combination of cotton and rice with sunflower and wheat have been analysed in terms of prices realized by the growers during the respective periods. The crop produce of rice and cotton was mostly transacted by the private sector in 1987-88 to 1989-90 while that of wheat and sunflower was procured by the government agencies. In case of sugarcane, the sugarmills generally paid the support prices except in 1987-88 which was the first year after de-zoning and the sugarmills generally paid higher prices. On the contrary, most of the farm commodities were disposed in the open market during 1997-98 to 1999-2000 except wheat where the bulk of transactions have taken place at support prices as the substantial proportion of wheat produce was procured by the government agencies. Hence the support price was used for computing value of wheat produce for both periods, of sunflower for 1st period and of sugarcane for Ist period except 1987-88. The values of other commodities for both the periods, of sunflower for 1997-00 period and of sugarcane for 2nd period and 1987-88 were worked out by using the average market price of respective producer area markets of each crop during the post harvest periods.

3. Results and Discussion

The comparative economics of competing crops for the periods, 1987-88 to 1989-90 and 1997-98 to 1999-00 in the Punjab and Sindh in terms of output-input ratio, gross revenue per day of crop duration, per rupee of purchased inputs cost and per unit of irrigation water is summarized in Table-1 and 2. The province-wise detail is explained in the following paragraphs.

Table-1: Comparison of Economic Position of Competing Crops in the Punjab During 1987-88 to 1989-90 and 1997-98 to 1999-00

Crops/crop combinations	Output-input ratio		Gross revenue per					
			Rupee of purchased inputs cost		Day of crop duration		Acre-inch of water used	
	87-90	97-00	87-90	97-00	87-90	97-00	87-90	97-00
	Rupees							
1. Basmati Paddy	1.17	1.05	2.94	1.95	15	44	55	136
2. Irri paddy	0.99	1.05	2.46	1.92	12	39	42	113
3. Cotton	1.34	1.37	3.30	3.04	17	56	162	612
4. Wheat	1.05	0.98	3.26	3.07	11	34	125	413
5. Sunflower (spring)	1.12	1.24	4.34	3.92	19	56	125	364
6. Basmati+wheat	1.12	1.02	3.07	2.32	13	39	72	193
7. Irri+Wheat	1.02	1.02	2.80	2.33	11	37	62	171
8. Basmati + sunflower	1.15	1.14	3.51	2.61	17	49	76	198
9. Irri +sunflower	1.06	1.14	3.27	2.64	15	46	67	179
10. Cotton+wheat	1.23	1.22	3.29	3.05	14	47	148	531
11. Cotton + sunflower	1.24	1.32	3.65	3.32	18	56	145	488
12. Sugarcane	1.21	1.25	3.64	3.88	14	40	80	358

Source: APCom's support price policies for various crops/years.

3.1 Punjab

In the Punjab, the rice crop directly competes with cotton in certain areas. During 1987-88 to 1989-90, cotton had a distinct edge over each of basmati paddy and Irri paddy in terms of all the economic criteria. Within rice varieties, basmati was a more profitable in view of all the economic

indicators adopted in this analysis. The output-input ratio of less than one for Irri paddy indicates that the gross cost was not fully recovered in Irri farming in the Punjab during 1987-88 to 1989-90. Among the rabi crops, wheat directly competed with the spring-planted sunflower in irrigated areas of the Punjab. Sunflower out-competed wheat in respect of all the economic parameters except returns to irrigation water where there was not much difference in their economic position.

In case of indirect competition in the late 1980's, the cotton+sunflower combination out-performed all the competing enterprises in all the criteria except returns to irrigation water where the cotton+wheat rotation was the best. The cotton+wheat also followed the former with a decimal margin in terms of returns to overall investment. Similarly sugarcane was the close runner-up to cotton+sunflower in returns to purchased inputs and output input ratio. As compared to rice combinations, sugarcane was more profitable in all respects except returns to crop duration where combination of sunflower with basmati or Irri performed better. Within the rice combinations, the basmati+sunflower had a definite edge followed by basmati+wheat and Irri +sunflower in respect of different indicators. The Irri+wheat was the least profitable enterprise in the Punjab.

During 1997-98 to 1999-00, cotton has an outright edge over rice in respect of all the economic indicators. Among the rabi crops, sunflower has been quite profitable as compared to wheat in terms of all the economic criteria considered in this analysis except returns to irrigation water. The output-input ratio of less than one for wheat indicates that the gross cost was not recovered in this enterprise in the late 1990's.

In case of indirect competition during 1997-98 to 1999-00, the relative profitability of competing crops presents a mixed picture. Cotton+sunflower combination gains a better position in returns to overall investment and crop duration. Sugarcane tops the list in returns to purchased inputs, while the cotton+wheat compares quite favourably in returns to irrigation water. The cotton combinations generally perform better than those of rice. Within the rice varieties, the basmati combinations are either at par or

better than those of Irri. Irri+wheat rotation has been the least earning enterprise in the late 1990's too.

3.2 Sindh

The comparative economics of competing crops in Sindh is presented in Table-2. In Sindh, Irri paddy directly competes with cotton in certain areas. During 1987-88 to 1989-90, cotton performed much better than Irri paddy in all the economic variables except revenue per crop day where the returns from both the crops were at par. Among the rabi crops, wheat faced a direct competition from the spring-sown sunflower. Sunflower had a definite edge over wheat whatever criterion is used to evaluate their economic position in 1987-88 to 1989-90.

Table-2: Comparison of Economic Position of Competing Crops in Sindh During 1987-88 to 1989-90 and 1997-98 to 1999-00

Crops/crop combinations	Output-input ratio		Gross revenue per					
			Rupee of purchased inputs cost		Day of crop duration		Acre-inch of water used	
	87-90	97-00	87-90	97-00	87-90	97-00	87-90	97-00
	---------- Rupees ----------							
1. Irri paddy	1.14	1.26	3.36	2.80	11	43	40	137
2. Cotton	1.35	1.39	3.67	3.14	11	50	106	663
3. Wheat	1.10	1.01	3.51	3.18	11	33	122	351
4. Sunflower (spring)	1.12	1.24	4.34	3.92	19	56	125	364
5. Irri+wheat	1.12	1.14	3.43	2.96	11	38	59	187
6. Irri+sunflower	1.13	1.25	3.87	3.28	15	48	66	201
7. Cotton+wheat	1.23	1.24	3.60	3.15	11	43	111	511
8. Cotton + sunflower	1.22	1.33	3.98	3.41	14	52	115	499
9. Sugarcane	1.51	1.49	4.94	3.96	18	43	103	362

Source: APCom's support price policies for various crops/years.

In case of indirect competition in the late 1980's, sugarcane had a distinct edge over the competing enterprises in all the economic indicators except returns to irrigation water where the cotton combination with sunflower or wheat respectively performed better. Among the crop combinations, the cotton+sunflower out-competed the alternatives in respect of returns to purchased inputs and irrigation water. However, the Irri+sunflower performed better in view of revenue per crop day while the cotton+wheat surpassed in output-input ratio. In Sindh too, the Irri+wheat combination was the least earning enterprise during this period.

During 1997-98 to 1999-00, cotton enjoys a definite edge over Irri paddy whatever criterion is used to evaluate their economic position. Among the rabi crops, the spring-planted sunflower is much profitable than wheat in respect of all the economic indicators adopted in this analysis.

In case of indirect competition in the late 1990's, the economic position of competing crops provides a mixed pattern. Sugarcane enjoys a superior position over the competing enterprises in terms of returns to overall investment and purchased inputs followed by cotton+sunflower combination. The cotton+sunflower performs better in returns to crop duration followed by Irri+sunflower. However, the cotton+wheat excels in view of returns to irrigation water while the cotton+sunflower ranks second. Among the crop combinations, the cotton+sunflower performs better in terms of all the economic criteria except returns to irrigation water where it marginally falls behind cotton+wheat. The Irri+wheat has been the least profitable enterprise in 1997-98 to 1999-2000 too.

4. Inter-Period Comparison

In the Punjab, cotton had a distinct edge over basmati and Irri paddy during both the periods. The spring-planted sunflower out-competed wheat in most of the economic criteria during 1987-88 to 1989-90. This edge continued during 1997-98 to 1999-00 too except in returns to irrigation water where it lagged behind the latter.

In case of indirect competition, the cotton+sunflower out-competed in terms of all the indicators except returns to irrigation water in 1987-88 to

1989-90 where it ranked second after cotton + wheat. In 1997-98 to 1999-2000, the cotton + sunflower retained its previous position except in returns to purchased inputs where it was led by sugarcane.

In Sindh, the economic position of cotton has slightly improved against Irri paddy over time. Cotton had an edge over Irri paddy in the late 1980's in most of the economic criteria except returns to crop duration while it out-competed the latter in all respects in the late 1990's. Sunflower maintained its superior position over wheat in all the economic indicators over time.

In case of indirect competition, sugarcane lost its economic position over time. Sugarcane out-competed all the alternatives in most of the criteria except returns to irrigation water in 1987-88 to 1989-90 where it lagged behind the cotton combinations. In 1997-98 to 1999-2000, the sunflower combinations also surpassed sugarcane in returns to crop duration.

5. Concluding Remarks

In the Punjab, cotton has maintained its profitable position over basmati and Irri paddy during the course of time. Sunflower has also maintained its edge over wheat in 1997-98 to 1999-00 in most of economic criteria. The relative profitability of cotton+sunflower over time has increased in terms of all criteria except returns to purchased inputs. The economics of cotton + wheat has also marginally improved overtime. The economic position of basmati + wheat has declined in two criteria, while that of sugarcane has marginally improved over time except in returns to purchased inputs.

In Sindh, the relative profitability of cotton has slightly improved against Irri paddy over time. Sunflower has maintained its superior position over wheat. The relative profitability of cotton + wheat has slightly improved. Sugarcane has marginally lost its economic position against competing enterprises, while the sunflower combinations have slightly gained overtime.

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STATISTICAL APPENDIX

Table-1: Growth Rates of Major Crops in Pakistan 1947-48 Through 1999-00

Period	Parameter	Crops				
		Wheat	Rice	Maize	Sugarcane	Cotton
		---------- Per cent per annum ----------				
1947-48 to 1959-60						
	Area	1.53	2.74	2.10	7.61	1.79
	Yield	-1.18	-0.19	0.66	-1.53	2.09
	Production	0.33	2.54	2.62	6.12	3.86
1959-60 to 1969-70						
	Area	2.85	3.22	3.41	4.24	3.39
	Yield	3.37	4.44	0.98	3.67	3.23
	Production	6.32	7.80	4.42	8.06	6.48
1969-70 to 1979-80						
	Area	1.27	3.31	0.43	3.19	0.80
	Yield	3.18	0.59	1.79	-0.46	-1.54
	Production	4.49	3.92	2.24	2.72	-0.76
1979-80 to 1989-90						
	Area	1.06	0.36	1.85	0.24	2.48
	Yield	1.52	-0.52	1.01	0.79	6.96
	Production	2.60	-0.16	2.88	1.03	9.61
1989-90 to 1999-00						
	Area	0.77	1.82	0.41	2.04	1.34
	Yield	2.01	3.11	0.82	1.84	-0.88
	Production	2.80	4.98	1.25	3.92	0.31
1947-48 to 1999-00						
	Area	1.57	2.07	1.90	3.17	1.99
	Yield	2.36	1.81	0.88	0.93	2.46
	Production	3.98	3.92	2.79	4.10	4.50

Note: The above growth rates are trend growth rates and have been calculated through Ordinary Least Squares (OLS) Method.

Table-2: Distribution of Farm Size in Punjab and Sindh by Management Categories

Province/ Category	Average Farm Size				Distribution of Farmers			
	Wheat	Rice	Cotton	Sugar-cane	Wheat	Rice	Cotton	Sugar-cane
	--------- Acres ---------				-------- Per cent -------			
Punjab								
Progressive	27	7	30	24	25	29	25	21
Average	20	11	22	16	50	48	49	49
Traditional	16	9	17	11	25	23	26	30
Combined	21	10	23	16	100	100	100	100
Sindh								
Progressive	35	6	49	20	26	35	30	39
Average	46	8	28	29	46	42	47	36
Traditional	28	5	17	14	28	24	23	25
Combined	38	7	31	22	100	100	100	100

Note: The farmers have been post stratified into management categories using following criteria:

Progressive: Enlightened farmers who use recommended doses of certified seed, adopt the latest technology and crop husbandry practices, use optimum plant protection measures and supplement irrigation water if required.

Traditional: Farmers who are using age old convential farming practices, have not adopted available farm management technology, use their own seed and are erratic about plant protection measures.

Average: Farmers who are in the transitional stage from traditional to progressive are termed as average farmers.

Source: APCom Field Surveys.

Crop	Conducted in	
	Punjab	Sindh
Wheat	1997-98	1996-97
Rice	1994-95	1995-96
Cotton	1994-95	1995-96
Sugarcane	1990-91	1990-91

Table-3: Area Under Important Agricultural Crops

Year	Wheat	Cotton	Ricc		Sugarcane	Gram	Onions	Potatoes	Sunflower
			Basmati	Others					
	---------- Thousand hectares ----------								
1980-81	6984	2109	824	1109	825	843	43	38	4
1981-82	7223	2214	844	1132	947	902	43	45	7
1982-83	7398	2263	836	1142	912	893	45	52	8
1983-84	7343	2221	825	1173	897	920	47	50	
1984-85	7259	2242	779	1219	904	1014	48	55	22
1985-86	7403	2364	759	1104	780	1033	49	63	20
1986-87	7706	2505	804	1262	762	1082	51	61	33
1987-88	7308	2568	835	1128	842	821	55	58	43
1988-89	7730	2619	1003	1039	877	979	58	64	29
1989-90	7845	2599	1105	1002	854	1035	59	80	26
1990-91	7911	2662	1120	993	884	1092	59	72	31
1991-92	7878	2836	1066	1031	896	997	64	76	63
1992-93	8300	2836	1035	938	885	1008	68	76	57
1993-94	8034	2805	1104	1084	963	1045	70	79	45
1994-95	8170	2653	1145	979	1009	1065	75	79	68
1995-96	8377	2997	1148	1014	963	1119	78	79	86
1996-97	8109	3149	1174	1077	965	1100	81	86	99
1997-98	8355	2960	1106	1112	1056	1102	81	105	98
1998-99	8230	2923	1216	1208	1155	1077	86	110	144
1999-00	8530	2983	1247	1270	1015	927	110	111	114

Sources:

- Various issues of Agricultural Statistics of Pakistan, MINFAL, Islamabad.
- Economic Survey, 1999-00, Economic Advisor's Wing, Finance Division, Islamabad.

Table-4: Production of Important Agricultural Crops

Year	Cotton	Wheat	Rice		Sugarcane	Gram	Onions	Potatoes	Sunflower
			Basmati	Others					
	000 bales	000 tonnes							
1980-81	4201	11475	980	2143	32359	337	448	394	3
1981-82	4398	11304	1055	2375	36580	294	452	477	6
1982-83	4844	12414	1010	2434	32534	491	475	518	6
1983-84	2908	10882	965	2374	34287	522	503	510	
1984-85	5930	11703	958	2357	32140	524	515	543	18
1985-86	7155	13923	883	2036	27856	586	559	618	18
1986-87	7760	12016	917	2569	29926	583	577	594	36
1987-88	8633	12675	943	2298	33029	372	633	563	43
1988-89	8385	14419	1099	2101	36976	456	707	645	34
1989-90	8560	14316	1217	2003	35494	562	713	831	25
1990-91	9628	14565	1220	2041	35989	531	702	751	35
1991-92	12822	15684	1092	2151	38865	513	809	860	83
1992-93	9054	16157	1124	1992	38059	347	854	933	62
1993-94	8041	15213	1267	2728	44427	411	912	1056	50
1994-95	8697	17002	1352	2095	47168	559	1013	1105	86
1995-96	10595	16907	1488	2479	45230	680	1098	1064	110
1996-97	9374	16651	1564	2741	41998	594	1131	964	129
1997-98	9184	18694	1439	2894	53104	767	1077	1426	130
1998-99	8790	17858	1687	2987	55191	698	1138	1810	195
1999-00	11240	21120	1764	3392	43193	565	1648	1879	150

Sources:

- Various issues of Agricultural Statistics of Pakistan, MINFAL, Islamabad.
- Economic Survey, 1999-00, Economic Advisor's Wing, Finance Division, Islamabad.

Table-5: Yield of Important Agricultural Crops

Year	Wheat	Cotton	Rice		Sugarcane	Gram	Onions	Potatoes	Sunflower
			Basmati	Others					
	---------- Kgs per hectare --------				Tonne/ha	Kgs/ha	Tonne/ha	Tonne/ha	Kgs/ha
1980-81	1643	339	1189	1932	39	400	10	10	750
1981-82	1565	338	1250	2098	39	326	11	11	857
1982-83	1678	364	1209	2132	36	550	11	10	750
1983-84	1482	223	1170	2024	38	567	11	10	
1984-85	1612	450	1230	1933	36	517	11	10	818
1985-86	1881	515	1164	1844	36	567	11	10	900
1986-87	1559	527	1140	2036	39	539	11	10	1091
1987-88	1734	571	1130	2038	39	453	12	10	1000
1988-89	1865	544	1096	2023	42	466	12	10	1172
1989-90	1825	560	1101	2000	42	543	12	10	962
1990-91	1841	615	1089	2055	41	486	12	10	1129
1991-92	1991	769	1025	2086	43	515	13	11	1317
1992-93	1947	543	1086	2123	43	344	13	12	1088
1993-94	1894	487	1147	2518	46	393	13	13	1111
1994-95	2081	557	1180	2139	47	525	14	14	1265
1995-96	2018	601	1296	2445	47	608	14	13	1279
1996-97	2053	506	1332	2545	44	540	14	11	1303
1997-98	2237	527	1301	2603	50	696	13	14	1327
1998-99	2170	511	1387	2473	48	648	13	16	1354
1999-00	2588	641	1415	2675	43	609	15	17	1316

Sources:

- Various issues of Agricultural Statistics of Pakistan, MINFAL, Islamabad.
- Economic Survey, 1999-00, Economic Advisor's Wing, Finance Division, Islamabad.

Table-6: Farm Level Cost of Production of Major Crops*

Crop/ Year	Wheat		Seed Cotton		Rice Paddy			Sugarcane		
					Basm-ati	IRRI	IRRI			
	Punjab	Sindh	Punjab	Sindh	Punjab		Sindh	Punjab	Sindh	NWFP
	Rupees per 40 kgs									
1982-83	65	54	-	-	93	55	56	-	-	-
1983-84	73	64	166	-	85	56	37	-	-	-
1984-85	70	64	176	107	85	57	37	7.10	7.10	7.10
1985-86	72	66	182	112	88	59	40	7.17	7.17	7.17
1986-87	77	70	170	163	104	68	52	7.73	6.92	7.67
1987-88	77	77	175	167	109	69	53	7.60	7.15	7.86
1988-89	81	80	175	167	114	73	56	8.21	7.60	8.36
1989-90	81	79	185	175	114	73	56	9.14	8.34	9.31
1990-91	93	94	214	211	136	82	67	10.53	9.39	10.90
1991-92	109	108	248	247	165	101	75	12.55	10.86	12.18
1992-93	123	121	278	273	174	106	83	13.23	12.72	13.57
1993-94	133	136	294	288	189	114	88	14.75	13.88	15.23
1994-95	153	155	328	330	213	128	103	16.13	15.81	16.39
1995-96	167	170	364	373	228	139	114	16.94	16.80	17.40
1996-97	204	201	412	425	259	161	130	18.72	18.40	18.79
1997-98	244	241	544	519	297	182	144	22.21	22.22	22.18
1998-99	254	247	581	557	310	189	158	25.11	24.57	24.57
1999-00	269	261	606	582	329	204	167	26.25	25.48	25.58
2000-01	285	264	660	610	353	210	168	27.22	26.39	26.51

* Covered Under Support Price Programme. The above costs are of the average growers of main producing areas.

Source: APCom, Support Price Policies – Various issues.

Table-7: Farm Level Cost of Production of Minor Crops*

Crop/ Year	Non-traditional Oilseeds				Potatoes	Gram	Onions	
	Sunflower	Soyabean	Safflower	Canola			Punjab, Sindh & NWFP	Baloch-Istan
	---------- Rupees per 40 kgs ----------							
1982-83	127	111	112	-	38	141	23	23
1983-84	139	116	118	-	-	-	-	-
1984-85	139	118	114	-	41	138	-	-
1985-86	144	121	118	-	44	139	29	29
1986-87	146	121	119	-	43	149	29	29
1987-88	152	126	123	-	41	149	31	31
1988-89	165	133	128	-	47	157	34	34
1989-90	165	133	128	-	49	172	37	37
1990-91	186	164	140	-	49	173	43	43
1991-92	203	183	165	-	58	176	50	42
1992-93	218	195	175	-	61	192	55	48
1993-94	238	209	-	-	68	225	61	52
1994-95	282	247	204	-	73	263	67	59
1995-96	318	282	241	-	79	298	72	64
1996-97	377	336	280	371	98	313	82	73
1997-98	412	372	308	397	123	347	91	84
1998-99	434	388	328	421	125	323	102	93
1999-00	448	412	337	455	123	376	108	106
2000-01	461	411	342	461	124	436	-	125

* Covered Under Support Price Programme. The above costs are of the average growers of main producing areas.

Source: APCom, Support Price Policies – Various issues.

Table-8: Procurement Centre Level Cost of Production of Major Crops*

Crop/ Year	Wheat		Seed Cotton		Rice Paddy			Sugarcane		
					Basmati	IRRI	IRRI			
	Punjab	Sindh	Punjab	Sindh	Punjab		Sindh	Punjab	Sindh	NWFP
	Rupees per 40 kgs									
1982-83	67	-	-	-	93	55	56	-	-	-
1983-84	75	64	169	-	85	56	37	-	-	-
1984-85	70	64	176	107	85	57	37	7.10	7.10	7.10
1985-86	72	66	182	112	88	59	40	7.17	7.17	7.17
1986-87	77	70	170	163	104	68	52	7.73	6.92	7.67
1987-88	77	77	175	167	109	69	53	7.60	7.15	7.86
1988-89	81	80	175	167	114	73	56	8.21	7.60	8.36
1989-90	81	79	185	175	114	73	56	11.08	10.31	11.17
1990-91	96	96	214	211	136	82	67	13.23	11.89	12.90
1991-92	112	111	253	252	168	104	78	15.35	13.46	14.28
1992-93	126	124	283	278	177	109	86	16.40	16.10	15.92
1993-94	137	140	299	293	192	117	91	17.93	17.26	17.58
1994-95	158	160	335	335	218	133	108	19.33	19.19	18.74
1995-96	172	175	369	378	233	144	119	20.20	20.28	19.75
1996-97	212	209	419	432	265	167	136	22.26	22.23	21.31
1997-98	252	249	554	529	305	190	152	26.06	26.06	24.95
1998-99	263	256	591	567	318	197	166	29.26	28.48	27.37
1999-00	279	271	616	592	337	212	175	30.40	29.38	28.38
2000-01	297	276	670	620	363	220	178	31.15	30.32	29.48

* Covered Under Support Price Programme

Source: APCom, Support Price Policies – Various issues.

Table-9: Procurement Centre Level Cost of Production of Minor Crops*

Crop/ Year	Non-traditional Oilseeds**				Potatoes	Gram	Onions	
	Sunflower	Soyabean	Safflower	Canola			Punjab, Sindh & NWFP	Baloch-Istan
	---------- Rupees per 40 kgs ----------							
1982-83	127	111	112	-	40	141	25	25
1983-84	139	116	118	-	-	-	-	-
1984-85	139	118	114	-	44	138	-	-
1985-86	144	121	118	-	44	139	31	31
1986-87	146	121	119	-	43	149	32	32
1987-88	152	126	123	-	41	149	33	33
1988-89	165	133	128	-	47	157	36	36
1989-90	165	133	128	-	52	172	39	39
1990-91	186	164	140	-	53	176	46	46
1991-92	208	188	170	-	63	179	53	45
1992-93	223	200	180	-	66	196	58	51
1993-94	243	214	-	-	73	228	66	55
1994-95	287	252	209	-	79	268	72	64
1995-96	323	288	246	-	85	303	78	70
1996-97	384	343	286	378	106	319	89	79
1997-98	420	380	316	405	133	355	98	91
1998-99	443	397	337	430	135	333	112	100
1999-00	458	422	347	465	133	387	119	118
2000-01	473	423	354	473	136	449	-	138

* Covered Under Support Price Programme

** Prior to 1991-92, GCP used to procure N.T.O from the farms, hence the costs at farm and procurement centre of these oilseeds were the same.

Source: APCom, Support Price Policies – Various issues.

Table-10: Nominal and Real Support Prices* of Food Crops 1980-81 to 1999-2000

Year	Wheat		Rice Paddy			
			Basmati		IRRI (FAQ)	
	Nominal	Real	Nominal	Real	Nominal	Real
1	2	3	4	5	6	7
	---------- Rupees per 40 kgs ----------					
1980-81	58	116	75	150	39	77
1981-82	58	104	85	153	45	81
1982-83	64	110	88	151	49	84
1983-84	64	102	90	144	51	82
1984-85	70	106	90	136	51	77
1985-86	80	116	93	135	53	77
1986-87	80	112	102	143	53	74
1987-88	83	109	130	171	55	72
1988-89	85	102	125	149	60	72
1989-90	96	108	144	162	66	74
1990-91	112	112	144	144	73	73
1991-92	124	112	155	140	78	71
1992-93	130	107	175	144	85	70
1993-94	160	118	185	137	91	67
1994-95	160	105	210	137	103	67
1995-96	173	102	222	131	112	66
1996-97	240	127	255	135	128	68
1997-98	240	118	310	152	153	75
1998-99	240	111	330	153	175	81
1999-00	300	128	350	150	185	79

* Deflated by CPI and expressed in 1990-91 rupees.

Source: APCom, Support Price Policies – Various issues.

Table-11: Nominal and Real Support Prices* of Cash Crops: 1980-81 to 1999-2000

Year	Seed Cotton		Sugarcane			
	MNH-93		Punjab		Sindh	
	Nominal	Real	Nominal	Real	Nominal	Real
1	2	3	4	5	6	7
	---------- Rupees per 40 kgs ----------					
1980-81	182	363	9.65	19.26	9.81	19.58
1981-82	192	345	9.65	17.35	9.81	17.62
1982-83	197	338	9.65	16.56	9.81	16.84
1983-84	200	320	9.65	15.44	9.81	15.70
1984-85	203	307	9.65	14.61	9.81	14.85
1985-86	207	300	9.65	14.00	9.81	14.23
1986-87	207	290	11.79	16.51	11.95	16.74
1987-88	207	273	11.79	15.53	11.95	15.74
1988-89	210	251	12.59	15.04	12.86	15.36
1989-90	225	253	13.75	15.49	14.00	15.77
1990-91	**260**	**260**	**15.25**	**15.25**	**15.75**	**15.75**
1991-92	290	262	16.75	15.15	17.00	15.37
1992-93	310	255	17.50	14.41	17.75	14.62
1993-94	325	240	18.00	13.32	18.25	13.50
1994-95	423	277	20.50	13.42	20.75	13.59
1995-96	423	250	21.50	12.71	21.75	12.85
1996-97	540	285	24.00	12.69	24.50	12.95
1997-98	540	265	35.00	17.16	36.00	17.65
1998-99	-	-	35.00	16.23	36.00	16.69
1999-00	825**	370	35.00	14.96	36.00	15.39

Source: APCom, Support Price Policies – Various issues.

* Deflated by CPI and expressed in 1990-91 rupees.

** At the start of picking season, Rs 825 per 40 kgs was fixed as a result of mutual understanding between the growers, spinners and the Government. But it could not be implemented.

Table-12: Nominal and Real Support Prices* of Non-traditional Oilseeds 1980-81 to 1999-2000

Year	Sunflower		Soybean		Safflower		Canola	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1	2	3	4	5	6	7	8	9
	---------- Rupees per 40 kgs ----------							
1980-81	118	235	107	214	96	193	-	-
1981-82	133	239	117	210	122	219	-	-
1982-83	140	240	122	209	120	206	-	-
1983-84	150	240	140	224	125	200	-	-
1984-85	170	257	160	242	140	212	-	-
1985-86	170	247	160	232	140	203	-	-
1986-87	170	238	160	224	140	196	-	-
1987-88	170	224	160	211	140	184	-	-
1988-89	177	211	165	197	143	171	-	-
1989-90	205	231	185	208	165	186	-	-
1990-91	**225**	**225**	**200**	**200**	**180**	**180**	-	-
1991-92	250	226	230	208	220	199	-	-
1992-93	280	231	250	206	220	181	-	-
1993-94	315	233	275	203	270	200	-	-
1994-95	315	206	275	180	270	177	-	-
1995-96	315	186	275	163	270	160	-	-
1996-97	450	238	345	182	300	159	450	238
1997-98	450	221	345	169	300	147	450	221
1998-99	500	232	410	190	350	162	500	232
1999-00	500	224	410	184	350	157	-	-

Source: APCom, Support Price Policies – Various issues.

* Deflated by CPI and expressed in 1990-91 rupees.

(-) Not fixed.

Table-13: Nominal and Real Support Prices* of Kitchen Crops: 1980-81 to 1999-00

Year	Potatoes		Gram		Onions	
	Nominal	Real	Nominal	Real	Nominal	Real
1	2	3	4	5	6	7
	---------- Rupees per 40 kgs ----------					
1980-81	27	53	-	-	19	39
1981-82	27	48	-	-	19	35
1982-83	41	70	-	-	25	43
1983-84	41	65	153	245	30	48
1984-85	42	64	153	232	30	45
1985-86	42	61	153	222	33	47
1986-87	45	62	161	225	35	48
1987-88	45	59	161	211	37	48
1988-89	50	60	180	215	40	48
1989-90	55	62	200	225	42	47
1990-91	**55**	**55**	**210**	**210**	**52**	**52**
1991-92	65	59	230	208	60	54
1992-93	67	55	235	193	65	54
1993-94	77	57	275	203	78	58
1994-95	84	55	315	206	78	51
1995-96	84	50	330	195	85	50
1996-97	115	61	400	211	100	53
1997-98	145	71	425	208	125	61
1998-99	145	67	425	197	140	65
1999-00	145	62	450	192	-	-

Source: APCom, Support Price Policies – Various issues.

* Deflated by CPI and expressed in 1990-91 rupees.

(-) Not fixed.

Table-14: International Prices of Major Agricultural Commodities: 1980-81 to 1999-00

Year	Cotton (cif North Europe)		Wheat	Rice	Sugar		Edible oils		
	Sindh/ Punjab Afzal 1-1/32"	Index-B Cottoris	(Fob, pacific) US Western white	100% second grade (fob, Bangkok)	Raw sugar ISA price (fob & stowed caribbean) port in bulk	White sugar (fob & stowed London)	Soybean oil (fob Decature)	Palm oil (fob Malay-sia)	Sun-flower (fob NW Europ-ean ports)
	-- US cents/lb.--		---------- US $ per tonne ----------						
1980-81	-	-	N.A	N.A	-	-	519	588	N.A.
1981-82	64.96	63.96	N.A	N.A	203	284	464	571	N.A.
1982-83	65.95	67.25	165	272	174	243	405	445	N.A.
1983-84	74.13	79.68	145	267	139	190	520	502	N.A.
1984-85	54.00	57.55	140	217	139	146	681	742	N.A.
1985-86	36.13	39.25	134	188	133	185	572	498	N.A.
1986-87	59.84	59.59	108	186	139	187	343	283	N.A.
1987-88	63.94	64.97	119	220	206	246	349	344	N.A.
1988-89	61.42	63.50	168	284	263	351	519	443	476
1989-90	76.51	77.27	158	296	301	402	417	328	482
1990-91	76.32	77.22	117	292	203	303	458	317	480
1991-92	56.67	57.06	154	290	202	280	417	365	459
1992-93	53.99	53.25	150	253	211	274	471	379	492
1993-94	61.45	69.39	133	297	248	323	596	448	627
1994-95	75.89	75.44	163	282	302	397	605	647	691
1995-96	80.95	80.48	200	365	270	384	550	523	617
1996-97	76.23	75.27	163	342	245	319	504	525	545
1997-98	72.23	68.00	139	308	218	272	571	605	726
1998-99	51.28	68.00	115	290	174	233	439	487	560
1999-00	47.46	49.28	112	235	146	216	349	331	410

Sources:

1. For wheat: International Grain council – Various reports.
2. For cotton: Cotton Outlook – Various issues.
3. For rice: Food Outlook – Various issues.
4. For sugar: International Sugar Organization (ISO), London – Various reports.
5. For edible oils: Oil world – Various issues.

Table-15: Average Export Prices (fob Karachi) of Agricultural Commodities: 1980-81 to 1999-00

Year	Export Prices (fob Karachi)					
	Cotton	Rice		Sugar	Onions	Potatoes
		Basmati	IRRI			
	Rs/bale*	---------- Rupees per tonne ----------				
1980-81	2,719	7,029	3,168	-	1,580	1,820
1981-82	2,158	7,599	3,061	2,887	1,830	1,800
1982-83	2,599	8,005	2,668	2,619	1,220	1,940
1983-84	3,067	8,090	2,697	3,341	1,240	1,850
1984-85	2,824	9,394	3,030	-	1,460	2,270
1985-86	2,206	10,813	2,582	-	1,290	1,640
1986-87	2,036	12,369	2,577	-	1,140	1,500
1987-88	3,643	12,672	3,520	-	1,260	1,800
1988-89	3,648	13,259	4,420	5,820	2,260	2,140
1989-90	5,512	14,583	3,860	9,699	1,850	1,380
1990-91	5,765	10,494	3,881	-	3,460	2,400
1991-92	4,834	10,261	4,825	-	2,080	1,980
1992-93	4,527	11,189	5,364	-	2,190	2,140
1993-94	5,409	12,427	5,166	9,912	4,170	2,580
1994-95	10,550	12,526	5,961	11,936	3,900	2,540
1995-96	9,525	13,830	7,923	12,015	3,840	1,770
1996-97	10,053	17,469	7,847	-	4,250	3,820
1997-98	10,514	19,827	8,676	13,757	5,930	5,420
1998-99	11,316	24,050	10,450	12,739	17,710	6,960
1999-00	7,710	26,390	9,587	16,083	7,995	5,290

Note: * Per bale of 170 kgs.

Source: Federal Bureau of Statistics, Karachi.

Table-16: Average Import Prices (cif Karachi) of Agricultural Commodities: 1980-81 to 1999-00

Year	Import Prices (cif Karachi)							
	Wheat	Gram	Sugar	Onions	Potatoes	Edible oils		
						Soyabean	Palm	Sun-flower
	---------- Rupees per tonne ----------							
1980-81	2,076	-	6,704	8,760	1,710	5,770	5,450	-
1981-82	2,224	-	5,873	5,530	1,640	5,450	5,370	-
1982-83	2,204	-	4,248	5,280	5,420	5,760	2,270	-
1983-84	2,952	-	4,265	3,900	2,170	8,620	5,270	-
1984-85	2,807	-	-	-	-	12,470	8,640	-
1985-86	2,472	-	3,601	-	-	9,830	9,480	-
1986-87	3,132	-	3,686	-	-	6,830	6,490	-
1987-88	3,079	-	3,815	-	1,220	8,060	4,910	-
1988-89	3,229	-	4,708	-	-	11,560	6,960	-
1989-90	4,197	10,580	9,102	-	-	10,410	6,890	-
1990-91	3,208	8,360	8,269	3,730	1,070	13,733	8,340	-
1991-92	4,205	11,960	7,832	-	4,410	12,599	9,098	-
1992-93	4,212	8,730	7,357	2,560	3,900	11,494	11,296	18,234
1993-94	3,804	8,870	9,335	1,100	1,110	15,848	12,549	19,816
1994-95	4,874	12,450	13,228	2,070	1,030	21,394	22,214	22,683
1995-96	7,718	13,430	15,606	1,170	2,900	24,599	25,170	23,100
1996-97	7,570	10,860	14,480	2,360	2,560	23,489	22,420	24,400
1997-98	7,413	11,370	15,189	5,990	2,620	33,964	28,244	32,793
1998-99	5,886	17,420	15,122	3,800	1,570	30,881	30,488	36,378
1999-00	7,316	16,700	15,850	3,178	1,822	43,360	19,850	N.A

Sources:

1. Ministry of Finance - Economic Survey – Various issues.
2. Federal Bureau of Statistics, Karachi.

Table-17: Import Parity Prices of Agricultural Commodities 1980-81 to 1999-00

Years	Wheat based on fob (Pacific) price of US western white		Sugarcane based on fob (London) price of white sugar		Onions	Potatoes	Edible oils		
					Based on actual import prices		Soyabean	Sunfl-ower	Canola
	If consumed at Karachi	If consumed at Lahore	Punjab & NWFP	Sindh			Based on their respective quoted price		
	Rupees per 40 kgs								
1980-81	-	-	-	-	-	-	-	-	-
1981-82	-	-	-	-	-	-	-	-	-
1982-83	-	-	-	-	-	-	-	-	-
1983-84	-	-	-	-	-	-	-	-	-
1984-85	-	-	-	-	-	-	-	-	-
1985-86	-	-	-	-	-	-	-	-	-
1986-87	-	-	7	7	-	-	-	-	-
1987-88	-	-	-	-	-	-	-	-	-
1988-89	-	-	19	19	-	-	-	-	-
1989-90	171	-	20	20	-	-	-	-	-
1990-91	-	-	19	19	-	70	-	-	-
1991-92	170	200	20	20	-	223	129	178	-
1992-93	190	240	24	25	-	-	138	207	-
1993-94	175	227	-	-	-	-	163	296	-
1994-95	236	293	-	-	-	-	342	391	-
1995-96	323	397	46	47	-	280	422	368	391
1996-97	280	368	-	-	115	256	430	368	417
1997-98	265	357	-	-	151	-	476	547	536
1998-99	280	357	-	-	-	-	379	420	427
1999-00	281	366	-	-	-		357	325	330

Source: Support Price Policies – Various crops and issues, APCom, Islamabad.

Table-18: Export Parity Prices of Agricultural Commodities: 1980-81 to 1999-00

Years	Seed cotton based on Afzal 1-1/32" cif (North Europe) price	Rice (paddy) based on actual export prices		Sugarcane based on fob (London) price of white sugar		Onions	Potatoes
		Basmati	IRRI	Punjab & NWFP	Sindh	Based on actual exports prices	
	---------- Rupees per 40 kgs ----------						
1980-81	-	-	-	-	-	-	-
1981-82	-	-	-	-	-	-	-
1982-83	-	-	-	-	-	-	-
1983-84	-	-	-	-	-	-	-
1984-85	-	-	-	-	-	-	-
1985-86	-	169	30	-	-	39	-
1986-87	191	229	46	-	-	-	-
1987-88	352	229	46	-	-	-	-
1988-89	279	228	66	-	-	20	9
1989-90	426	237	94	-	-	164	87
1990-91	477	134	40	-	-	49	39
1991-92	-	155	84	-	-	52	112
1992-93	391	167	82	-	-	33	136
1993-94	539	201	70	19	19	169	121
1994-95	711	162	74	27	26	127	79
1995-96	851	168	110	-	-	117	87
1996-97	903	244	129	33*	34*	125	105
1997-98	844	359	155	34*	34*	190	118
1998-99	514	421	189	22	22	530	223
1999-00	514	489	165	22	23	193	142

Note: * Based on previous three years average prices.
Source: Support Price Policies - Various crops and issues, APCom, Islamabad.

Table-19: Support and Market Prices of Wheat and Quantities Procured: 1980-81 To 1999-00

Year	Support price	Market price *	Difference between market and support prices	Procurement by government agency	Government agency
	Rs per 40 kgs		Per cent	Million tonnes	
1980-81	58	60	3	3.99	PASSCO and Provincial Food Departments
1981-82	58	62	6	3.13	
1982-83	64	67	4	3.82	
1983-84	64	71	10	2.28	
1984-85	70	77	9	2.53	
1985-86	80	82	2	5.04	
1986-87	80	80	-	3.98	
1987-88	83	85	3	3.49	
1988-89	85	93	8.60	4.13	
1989-90	96	102	5.88	4.41	
1990-91	112	121	7.44	3.16	
1991-92	124	134	7.46	3.25	
1992-93	130	139	6.47	4.12	
1993-94	160	170	5.88	3.64	
1994-95	160	176	9.09	3.74	
1995-96	173	185	6.49	3.45	
1996-97	240	273	12.09	2.72	
1997-98	240	259	7.34	3.98	
1998-99	240	261	8.05	4.07	
1999-00	300	297	-1	8.55	

Note: * Average market price of Multan, Okara and Hyderabad during post harvest period: April – July.

Sources:

- MINFAL, Islamabad.
- ALMA, Karachi.
- Directorate of Agriculture (E&M), Punjab, Lahore.
- PASSCO, Lahore.
- Provincial Food Departments.

Table-20: Support and Market Prices of Basmati (Paddy) and Quantities Procured: 1980-81 to 1999-00

Year	Support price*	Market price **	Difference between market and support prices	Procurement by government agency	Government agency
	Rs per 40 kgs		Per cent	000 tonnes	
1980-81	75	N.A	N.A	-	
1981-82	85	N.A	N.A	-	
1982-83	88	90	2	-	
1983-84	90	92	2	-	
1984-85	90	92	2	-	
1985-86	93	114	23	-	
1986-87	102	113	11	-	
1987-88	130	141	8	-	
1988-89	135	135	-	-	
1989-90	143	136	-5	21.52	PASSCO
1990-91	143	143	-	18.06	
1991-92	155	158	2	5.70	
1992-93	175	190	9	5.57	
1993-94	185	194	5	78.00	
1994-95	211	192	-9	21.00	
1995-96	222	231	4	0.12	
1996-97	255	296	16	0.01	
1997-98	310	297	-4	Nil	
1998-99	330	362	10	Nil	
1999-00	350	358	2	Nil	

Notes:

* Support price of Basmati-385

** Average prices of Rice paddy (Basmati) in the main producing area markets of the Punjab during post-harvest period : November to January.

N.A Not available

Sources:
- MINFAL, Islamabad
- Directorate of Agriculture (E&M), Punjab, Lahore
- PASSCO, Lahore.

Table-21: Support and Market Prices of IRRI (Paddy) and Quantities Procured: 1980-81 To 1999-00

Year	Support price*	Market price**	Difference between market and support prices	Procurement by government agency	Government agency
	Rs per 40 kgs		Per cent	000 tonnes	
1980-81	39	N.A	N.A	N.A	PASSCO
1981-82	45	N.A	N.A	N.A	
1982-83	49	N.A	N.A	0.25	
1983-84	51	N.A	N.A	Nil	
1984-85	51	N.A	N.A	Nil	
1985-86	53	59	11	Nil	
1986-87	53	53	-	Nil	
1987-88	55	70	27	2.00	
1988-89	60	73	22	Nil	
1989-90	66	69	4	3.89	
1990-91	73	78	7	17.00	
1991-92	78	98	26	Nil	
1992-93	85	112	32	2.93	
1993-94	90	98	9	Nil	
1994-95	103	137	33	Nil	
1995-96	112	181	62	Nil	
1996-97	129	164	27	Nil	
1997-98	153	205	34	Nil	
1998-99	175	234	34	Nil	
1999-00	185	206	11	Nil	

Notes: * Support price of IRRI-6 (FAQ)

** Average market prices of rice paddy (IRRI-6) in the main producing areas of Sindh during post-harvest period: October-December

N.A Not available

Sources:

- MINFAL, Islamabad.
- ALMA, Karachi.
- Bureau of Supply and Prices, Government of Sindh, Karachi.
- PASSCO, Lahore.

Table-22: Support and Market Prices of Basmati (Rice Cleaned) and Quantities Procured: 1980-81 to 1999-00

Crop year	Support price*	Market price**	Difference between market & support price	Procurement by government agency	Government agency	Remarks
	Rs per 40 kgs		Per cent	000 tonnes		
1980-81	137	188	37	320	RECP	-
1981-82	150	213	42	388	RECP	-
1982-83	154	208	35	337	RECP	-
1983-84	160	206	29	265	RECP	-
1984-85	160	200	25	265	RECP	-
1985-86	166	227	37	226	RECP	-
1986-87	230	221	-4	236	RECP	-
1987-88	250	272	9	220	RECP	-
1988-89	258	271	5	500	RECP	-
1989-90	276	271	-2	541	RECP	-
1990-91	276	326	18	143	RECP	-
1991-92	300	321	7	122	RECP	-
1992-93	330	470	42	500	RECP	-
1993-94	350	500	43	145	RECP	-
1994-95	378	396	5	284	RECP	-
1995-96	408	442	8	51	RECP	-
1996-97	449	559	25	-	-	-
1997-98	449	563	25	-	-	-
1998-99	-	767	-	-	-	No support price was fixed
1999-00	-	729	-	-	-	

Notes:

* From 1980-81 to 1989-90: The prices of Basmati-370 are taken for FAQ and since 1990-91 onward these are in case of Basmati-385 for 10% brokens.

** Market prices are the average wholesale prices during post harvest period i.e. November to January in Gujranwala market.

Sources:

1. ALMA, Karachi.
2. Directorate of Agriculture (E&M), Punjab, Lahore.
3. Economic Survey, 1998-99, Finance Division, Economic Adviser's Wing, Government of Pakistan, Islamabad.
4. Rice Export Corporation of Pakistan (RECP), Karachi.

Table-23: Support and Market Prices of IRRI-6 (Rice Cleaned) And Quantities Procured: 1980-81 to 1999-00

Crop year	Support price*	Market price**	Difference between market & support price	Procurement by government agency	Government agency	Remarks
	Rs per 40 kgs		Per cent	000 tonnes		
1980-81	63	70	11	702	RECP	-
1981-82	73	82	13	706	RECP	-
1982-83	80	78	-2	890	RECP	-
1983-84	83	98	18	883	RECP	-
1984-85	83	120	47	959	RECP	-
1985-86	87	108	25	986	RECP	-
1986-87	87	95	10	1049	RECP	-
1987-88	89	95	7	614	RECP	-
1988-89	100	114	14	579	RECP	-
1989-90	113	120	6	793	RECP	-
1990-91	127	130	2	674	RECP	-
1991-92	140	159	14	370	RECP	-
1992-93	150	192	28	454	RECP	-
1993-94	157	197	25	681	RECP	-
1994-95	170	200	18	-	RECP	-
1995-96	183	251	37	155	RECP	-
1996-97	210	360	71	-	-	-
1997-98	252	323	28	-	-	-
1998-99	-	403	-	-	-	No support price was fixed
1999-00	-	330	-	-	-	

Notes:

* For FAQ.

** Market prices are the average wholesale prices during post harvest period i.e. October to January in Sukkur market.

Sources:

1. Economic Survey, 1998-99, Finance Division, Economic Adviser's Wing, Government of Pakistan, Islamabad.
2. Agricultural Statistics of Pakistan, 1998-99: MINFAL, Islamabad.
3. Rice Export Corporation of Pakistan (RECP), Karachi.

Table-24: Support and Market Prices of Seed Cotton and Quantities Procured: 1980-81 to 1999-00

Year	Support price[a]	Market price[b]	Difference between market and support prices	Procurement by Government agency[c]	Remarks
	Rs per 40 kgs		Per cent		
1980-81	182	174	-5	Nil	
1981-82	192	193	1	Nil	
1982-83	197	188	-5	Nil	
1983-84	200	336	40	Nil	
1984-85	203	182	-12	Nil	
1985-86	207	196	- 6	Nil	
1986-87	207	211	2	Nil	
1987-88	207	234	12	Nil	
1988-89	210	238	12	Nil	
1989-90	225	279	19	Nil	
1990-91	260	334	22	Nil	
1991-92	290	337	14	Nil	
1992-93	310	382	19	Nil	
1993-94	325	475	32	Nil	
1994-95	423	794	47	Nil	
1995-96	423	739	27	Nil	
1996-97	540	840	26	Nil	
1997-98	540	808	23	Nil	
1998-99	-	876	-	Nil	No support price fixed for 1998-99 crop by the Govt.
1999-00	825(d)	580	-	Nil	

Notes:

(a) Support price of Sarmast, Qalandri, CIM-70, Deltapine, MS-84, K-68/69, MNH-93, MNH-129, K-68/69, MNH-93, MNH-129.

(b) Average market prices of seed cotton (phutti) in the main producing areas of the Punjab and Sindh.

(c) Seed cotton was not purchased by the procurement agency. Instead, its support price was implemented indirectly by procuring cotton lint from the ginneries.

(d)

Sources:

- MINFAL, Islamabad.
- Pakistan Central Cotton Committee (PCCC), Karachi.
- ALMA, Karachi.
- Directorate of Agriculture (E&M), Punjab, Lahore.

Table-25: Support and Annual Average Spot Prices of Cotton (Lint) at Karachi and Quantities Procured: 1980-81 to 1999-00

Crop Year	Support price*	Market price**	Difference between market & support price	Procurement by government agency	Government agency	Remarks
	Rs per 40 kgs		Per cent	000 tonnes		
1980-81	476	482	1	1,881	CEC	-
1981-82	473	453	-4	1,698	CEC	-
1982-83	473	496	5	1,793	CEC	-
1983-84	496	824	66	269	CEC	-
1984-85	500	549	10	3,245	CEC	-
1985-86	500	509	2	4,371	CEC	-
1986-87	500	538	8	3,616	CEC	-
1987-88	504	610	21	3,693	CEC	-
1988-89	507	617	22	1,660	CEC	-
1989-90	539	732	36	610	CEC	-
1990-91	645	840	30	1,002	CEC	-
1991-92	715	883	23	2,851	CEC	-
1992-93	770	982	28	36	CEC	-
1993-94	801	1,232	54	159	CEC	-
1994-95	986	2,060	109	-	-	-
1995-96	986	1,962	99	-	-	-
1996-97	-	2,575	-	-	-	No support price was fixed
1997-98	-	2,525	-	-	-	
1998-99	-	2,722	-	-	-	
1999-00	-	2,051	-	89.81	TCP	

Notes:

* B-557 and NIAB-78 group

** From 1980-81 to 1989-90, the prices of B-557 are taken and since 1990-91 onward these are in case of NIAB-78.

Sources:

- Economic Survey, 1998-99, Finance Division, Economic Advisor's Wing, Government of Pakistan, Islamabad.
- Pakistan Central Cotton Committee, Karachi.
- Cotton Export Corporation (CEC), Karachi.

Table-26: Support and Market Prices of Gram and Quantities Procured: 1980-81 to 1999-00

Year	Support price	Market price*	Difference between market and support prices	Procurement by Government agencies	Government agency
	Rs per 40 kgs		Per cent	000 tonnes	
1980-81	-	186	-	-	-
1981-82	-	249	-	18.00	PASSCO
1982-83	-	189	-	-	-
1983-84	153	149	-3	-	-
1984-85	153	169	9	-	-
1985-86	153	151	-6	-	-
1986-87	161	131	-22	7.00	PASSCO
1987-88	161	242	26	-	-
1988-89	180	245	18	-	-
1989-90	200	182	-10	-	-
1990-91	210	177	-19	8.07	PASSCO
1991-92	230	267	14	-	-
1992-93	235	338	30	-	-
1993-94	275	479	43	-	-
1994-95	315	632	50		-
1995-96	330	332	1	-	-
1996-97	400	423	5	-	-
1997-98	425	401	-6	-	-
1998-99	425	628	32	-	-
1999-00	-	760	-	-	-
1999-00	425	670	44	-	-

Note:

* Average market prices of Mianwali, Bhakar, Sargodha & Jacobabad during post harvest season: April to June.

Sources:

- MINFAL, Islamabad.
- ALMA, Karachi.
- Directorate of Agriculture (E&M), Punjab, Lahore.
- Bureau of Supply & Prices, Government of Sindh, Karachi.
- Market Committees of Mianwali and Bhakkar.
- PASSCO, Lahore.

Table-27: Support and Market Prices of Onions and Quantities Procured: 1980-81 to 1999-00

Crop/ Year	Support price*	Market price**	Difference between market and support prices	Procurement by government agencies	Government Agency
	Rs per 40 kgs		Per cent	000 tonnes	
1980-81	19.30	27	40	Nil	-
1981-82	19.30	77	299	Nil	-
1982-83	25.00	49	96	Nil	-
1983-84	30.00	82	173	Nil	-
1984-85	30.00	62	107	Nil	-
1985-86	32.50	36	11	13.00	PASSCO, AM&SL
1986-87	34.50	76	120	5.00	AM&SL
1987-88	36.50	66	81	0.13	AM&SL
1988-89	40.00	94	135	Nil	-
1989-90	44.00	76	73	7.88	AM&SL
1990-91	54.50	123	126	Nil	-
1991-92	65.00	85	31	32.0	AM&SL
1992-93	70.00	156	123	Nil	-
1993-94	84.00	136	62	Nil	-
1994-95	84.00	168	100	Nil	-
1995-96	92.00	125	36	3.38	PASSCO
1996-97	106.00	201	90	Nil	-
1997-98	125.00	234	87	Nil	-
1998-99	140.00	257	84	Nil	-
1999-00	-	105	-	4.821	PASSCO

Notes:

* Support price of size above 50 mm upto 1988-89 and 40-50 mm afterward.

** Average market prices of Hyderabad (Jan-Feb) and Multan during post harvest season: May to June.

Sources:

- MINFAL, Islamabad.
- ALMA, Karachi.
- Directorate of Agriculture (E&M), Punjab, Lahore.
- Bureau of Supply & Prices, Government of Sindh, Karachi.

Table-28: Support and Market Prices of Potatoes and Quantities Procured: 1980-81 to 1999-00

Crop/ Year	Support price*	Market price**	Difference between market and support prices	Procurement by government agencies	Government Agency
	Rs per 40 kgs		Per cent	000 tonnes	
1980-81	26.80	61	56	Nil	-
1981-82	26.80	53	49	Nil	-
1982-83	40.50	35	-16	64.50	AM&SL
1983-84	40.50	60	33	Nil	-
1984-85	40.50	61	34	65.00	PASSCO
1985-86	42.00	45	7	11.50	PASSCO
1986-87	44.50	47	5	15.00	AM&SL
1987-88	44.50	94	53	Nil	-
1988-89	50.00	85	41	2.49	AM&SL
1989-90	55.00	38	-45	0.11	AM&SL
1990-91	55.00	104	47	Nil	-
1991-92	65.00	81	20	1.14	AM&SL
1992-93	67.00	82	18	2.00	AM&SL
1993-94	77.00	77	0.0	Nil	-
1994-95	84.00	103	18	2.70	PASSCO
1995-96	84.00	238	65	Nil	-
1996-97	115.00	288	60	Nil	-
1997-98	145.00	116	-25	1.00	PASSCO
1998-99	145.00	106	-37	Nil	-
1999-00	145.00	111	-31	1.9	PASSCO

Notes:

* Support price for the size of 40-55 mm.

** Average market prices of Lahore, Faisalabad and Okara during post harvest season: January to April.

Sources:

- Various Price Policy Reports of APCom.
- AM&SL.
- PASSCO.
- MINFAL.
- ALMA, Karachi.

Table-29: Support Prices and Procurement of Non-traditional Oilseeds: 1980-81 to 1999-00

Crop year	Sunflower		Soybean		Safflower		Procurement agency
	Support price* Rs/40 kgs	Procurement 000 tonnes	Support price* Rs/40 kgs	Procurement 000 tonnes	Support price* Rs/40 kgs	Procure-Ment 000 tonnes	
1980-81	117.90	-	107.18	-	96.46	-	GCP
1981-82	133	5.7	117	0.7	112	1.4	GCP
1982-83	140	7.7	122	1.0	120	1.0	GCP
1983-84	150	7.7	140	0.5	125	0.7	GCP
1984-85	170	9.2	160	0.3	140	0.3	GCP
1985-86	170	-	160	-	140	-	-
1986-87	170	32.6**	160	-	140	-	-
1987-88	170	32.3	160	0.3	140	0.3	GCP
1988-89	177	21.6	165	0.3	143	0.2	GCP
1989-90	205	16.3	185	0.2	165	0.1	GCP
1990-91	225	29.6	200	0.3	180	-	-
1991-92	250	29.8	230	-	220	-	-
1992-93	280	28.7	250	-	-	-	-
1993-94	315	0.1	275	-	270	-	-
1994-95	315	-	275	-	270	-	-
1995-96	315	-	275	-	270	-	-
1996-97	450	1.00	345	-	300	-	PASSCO
1997-98	450	-	345	-	300	-	-
1998-99	500	-	-	-	-	-	-
1999-00	500	-	410	-	350	-	-

Notes:

* Market prices of non-traditional oilseeds are not available.

** Sunflower + Soybean

Sources:

- Agricultural Statistics of Pakistan 1998-99.
- Various price policy reports, APCom.

Table-30: Estimated Requirements and Distribution of Improved Seed: 1993-94 to 1998-99

Crop	Year	Estimated Seed Requirement	Improved Seed Distribution	Improved Seed as % of Requirement
		----- Metric tonnes -----		
Wheat	1993-94	706,824	56,045	7.93
	1994-95	733,545	80,840	11.02
	1995-96	733,545	85,383	11.64
	1996-97	739,000	77,023	10.42
	1997-98	739,000	78,544	10.63
	1998-99	739,000	104,193	14.09
Cotton	1993-94	67,806	26,499	39.08
	1994-95	58,298	28,453	48.81
	1995-96	66,000	31,295	47.42
	1996-97	66,000	26,635	40.36
	1997-98	67,000	23,128	34.52
	1998-99	67,000	27,022	40.37
Rice	1993-94	44,000	2,170	4.93
	1994-95	43,000	2,662	6.19
	1995-96	49,000	3,517	7.18
	1996-97	43,000	1,751	4.07
	1997-98	43,000	1,734	4.03
	1998-99	59,570	2,281	3.83
Maize	1993-94	35,900	1,631	4.54
	1994-95	35,600	2,201	6.18
	1995-96	35,000	2,032	5.81
	1996-97	35,000	2,011	5.75
	1997-98	35,000	1,674	4.78
	1998-99	35,584	3,034	8.52
Sunflower	1993-94	410	271	66.10
	1994-95	525	359	68.38
	1995-96	808	586	72.52
	1996-97	1,750	807	46.11
	1997-98	1,000	571	57.10
	1998-99	2,809	1,547	55.08
Vegetables (excluding potatoes)	1993-94	4,000	N.A	-
	1994-95	4,000	N.A	-
	1995-96	4,900	4,052	82.69
	1996-97	5,000	4,603	92.06
	1997-98	5,000	3,181	63.62
	1998-99	5,000	4,678	93.56

Source: Federal Seed Certification and Registration Department.

Table-31: Average Prices of Fertilizer: 1980-81 to 1999-00

(Rs per nutrient kg)

Year	Nitrogen (N)	Phosphorus (P)	Potash (K)
1980-81	4.04	2.70	1.97
1981-82	4.14	2.66	1.48
1982-83	5.00	3.15	1.37
1983-84	5.45	3.94	1.60
1984-85	5.44	3.85	1.90
1985-86	5.46	3.86	1.52
1986-87	5.66	4.09	1.82
1987-88	5.68	4.68	2.21
1988-89	5.79	6.56	2.82
1989-90	6.64	6.47	3.59
1990-91	7.47	8.21	5.47
1991-92	7.91	8.27	6.20
1992-93	9.05	8.71	7.31
1993-94	10.47	12.69	10.79
1994-95	11.45	13.85	12.06
1995-96	11.95	16.14	13.22
1996-97	15.05	17.21	16.10
1997-98	15.39	17.94	20.81
1998-99	15.74	20.72	21.00
1999-00	14.99	20.11	22.60

Sources:

- From 1980-81 to 1984-85 = Fertilizer Related Statistics, October 1989, NFDC, Islamabad.
- From 1985-86 to 1997-98 = Pakistan Fertilizer Related Statistics September 1998, NFDC, Islamabad.
- For 1998-99 and 1999-00 = NFDC, Islamabad.

Table-32: Fertilizer Use Per Cropped Hectare: 1980-81 to 1999-00

Year	Nitrogen (N)	Phosphorus (P)	Potash (K)	All Nutrients (N+P+K)	N : P
	---------- Nutrient kgs per hectare ----------				
1980-81	43.6	11.7	0.5	55.8	3.73:1
1981-82	42.0	11.4	1.1	54.5	3.68:1
1982-83	47.3	13.2	1.3	61.8	3.58:1
1983-84	45.7	13.0	1.4	60.1	3.52:1
1984-85	46.9	14.7	1.2	62.8	3.19:1
1985-86	55.6	17.2	1.6	74.4	3.23:1
1986-87	63.8	19.6	2.0	85.4	3.26:1
1987-88	65.7	20.1	2.3	88.1	3.27:1
1988-89	60.7	17.9	1.1	79.7	3.39:1
1989-90	68.4	17.8	1.9	88.1	3.84:1
1990-91	67.4	17.8	1.5	86.7	3.79:1
1991-92	67.3	18.3	1.1	86.7	3.68:1
1992-93	72.9	21.8	1.1	95.8	3.34:1
1993-94	75.9	21.2	1.1	98.2	3.58:1
1994-95	78.5	19.3	0.7	98.5	4.07:1
1995-96	88.1	21.9	1.3	111.3	4.02:1
1996-97	86.6	18.3	0.4	105.3	4.73:1
1997-98	90.0	23.9	0.4	114.3	3.77:1
1998-99	91.4	20.3	0.9	112.5	4.66:1
1999-00(P)	97.4	26.2	0.8	124.5	3.7

Notes: Per hectare use of fertilizer has been waked out keeping in view the following assumptions:

a) Assumed for 1980-81 to 1982-83, wheat 48%, rice 12%, cotton 16% and sugarcane 9% of the total yearly off-take as adopted in the 5th Five Year Plan.

b) Assumed for 1983-84 to 1987-88, wheat 50%, rice 10%, cotton 15% and sugarcane 8% of the total yearly off-take as adopted for 6th Five Year Plan.

c) Assumed for 1998-89 and onward, wheat 47%, rice 10%, cotton 20% and sugarcane 11% based on Fertilizer Use Survey, 1986 conducted by NFDC.

d) Assumed for 1996-97 and 1997-98 and 1998-99, wheat 44.6%, Rice 10.5%, cotton 20.7% and sugarcane 8.1% of the total yearly off-take.

Source:

Calculated from the data given in:

- Pakistan Fertilizer Related Statistics, September 1998, NFDC, Islamabad.
- Agricultural Statistics of Pakistan, 1997-98, MINFAL, Islamabad.

Table-33: Per Hectare Use of Fertilizer on Important Crops 1980-81 to 1999-00

Year	Wheat	Rice	Cotton	Sugarcane	Total cropped area
	---------- Nutrient kgs per hectare ----------				
1980-81	74.2	66.7	82.0	117.6	55.8
1981-82	71.6	65.3	77.7	102.5	54.5
1982-83	80.7	75.3	87.9	122.8	61.8
1983-84	81.8	60.0	81.1	107.1	60.2
1984-85	86.2	62.5	83.9	110.7	62.9
1985-86	102.1	81.0	96.0	155.2	74.5
1986-87	115.7	86.2	107.0	187.7	85.4
1987-88	117.7	87.6	100.5	164.0	88.1
1988-89	105.8	85.2	132.9	217.8	79.7
1989-90	113.2	89.7	145.5	243.5	92.3
1990-91	112.5	89.5	142.4	235.3	86.8
1991-92	112.3	89.6	133.0	231.0	86.7
1992-93	121.6	108.9	151.3	270.2	95.7
1993-94	125.6	97.8	153.0	245.1	98.2
1994-95	125.6	102.6	164.7	237.9	98.6
1995-96	141.1	116.1	167.8	287.6	111.3
1996-97	132.7	112.4	158.8	203.2	106.2
1997-98	140.6	119.5	184.1	201.7	114.3
1998-99	133.8	108.2	176.9	175.9	111.9
1999-00	149.9	60.6	219.4	297.6	124.5

Sources:

- Agricultural Statistics of Pakistan, 1997-98, MINFAL, Islamabad for crop area.
- Pakistan Fertilizer Related Statistics, September 1998, NFDC, Islamabad for the fertilizer off-take data.

Table-34: Use of Pesticides in Pakistan: 1980 to 1999

Year	Import	Local formulation	Total quantity	Value
	-------- Metric tonnes -------			Million Rs
1980	-	-	665	39
1981	-	-	3,677	213
1982	3,552	1,448	5,000	320
1983	4,875	1,713	6,588	629
1984	6,081	3,132	9,213	2,256
1985	8,270	4,260	12,530	2,249
1986	8,834	5,665	14,499	2,978
1987	8,019	6,829	14,848	3,259
1988	6,256	6,816	13,072	2,334
1989	6,869	7,738	14,607	3,642
1990	7,502	9,941	17,443	4,561
1991	6,157	14,056	20,213	5,535
1992	6,691	16,748	23,439	6,554
1993	6,128	14,151	20,279	5,384
1994	10,693	14,176	24,869	5,808
1995	20,134	13,239	43,373	7,273
1996	24,151	19,068	43,219	9,987
1997	24,168	13,836	38,004	8,611
1998	22,765	18,081	40,846	6,960
1999				

Sources: Department of Plant Protection, Karachi.

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1. Manuscripts of articles, comments and reviews should be in English only and sent in triplicate preferably accompanied with 1.44 MB diskette in MS Words to the Editor, Pakistan Journal of Agricultural Economics. Comments and Reviews should be submitted alongwith two copies of relevant book or paper..

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