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Risk Analysis and Sustainability of Alternative Crop Production Systems

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Introduction

Agriculture is the mainstay of Pakistan’s economy. Being the lynchpin of the country’s economy, it continues to be the single largest sector and a central driving force for growth and development of the national economy. It accounts for 24 per cent of the GDP and employs 48.4 per cent of the total workforce. Agriculture contributes to growth as a supplier of raw materials to industry as well as a market for industrial products, and also contributes substantially to Pakistan’s exports earnings (GOP, 2003). Almost 67.5 per cent of the country’s population are living in rural areas and are directly or indirectly linked with agriculture for their livelihood. Any improvement in agriculture will not only help the country’s economic growth to rise at a faster rate, but will also benefit a large segment of the country’s population.

There are two principal crop seasons in Pakistan, namely the ‘Kharif’ sowing season which commences in April–June, harvesting during October–December; and the ‘Rabi’, which begins in October–December and ends in April–May. Rice, sugarcane, cotton, maize, bajra and jowar are ‘Kharif’ crops, while wheat, gram, tobacco, rapeseed, barley and mustard are ‘Rabi’ crops. Major crops, such as, wheat, rice, cotton and sugarcane account for 90 per cent of value added in major crops. The value added in major crops accounts for 41 per cent of value added in overall agriculture. Thus, the four major crops
(wheat, rice, cotton and sugarcane), on average, contribute 37 per cent to value added in overall agriculture, while the minor crops account for 16 per cent.

Wheat is the main staple food and the largest grain crop in the country. It contributed 13.8 per cent to the value added in agriculture and 3.4 per cent of gross domestic product (GDP). During 2003, wheat was cultivated on an area of 8,176 thousand hectares, showing a 1.8 per cent increase over the previous year. The size of the wheat crop for 2003 was provisionally estimated at 19,767 thousand tonnes, 3.0 per cent higher than the previous year. The yield per hectare was also expected to increase by 1.2 per cent. Wheat production during 2003 was less than the target (20 million tonnes) by 1.2 per cent because of unfavourable weather during March. The shortage of wheat was the result of below-targeted production (Govt. of Pakistan, 2003–04).

In agriculture, the producer confronts two types of eventualities. One of these is risk, while the other is uncertainty. Risk means a situation in which the probability of obtaining some output of an event is known. In everyday usage, a risky situation is one in which one of the outcomes involves some loss to the decision-maker (due, for example, to either weather or tastes). Uncertainty reflects a situation where the probability of obtaining a given outcome is not known (Todaro, 1997).

Production risk is random variability inherent in a farm’s production process. Weather, diseases and pest infestation lead to production risk in crop and livestock production, while fire, wind, and theft are other sources of production risk. Yield fluctuation is greatly influenced by weather and other uncontrollable factors, and risk and uncertainty influence the efficiency of resource-use in agriculture and decision-making processes. Anderson and Griffiths (1982) extended their multistage estimation approach for quantifying the impact of selected factors of production and empirical relationships in an analysis of the efficient allocation of resources. Thus, risk-bearing is concentrated among individual farmers and farm families, rather than spread over numerous corporate shareholders. In the case of several commodities, the low elasticities of prices and incomes that are subject to weather and other uncontrollable events cause wide swings in commodity prices. The effects of these factors combine to severely test farmers’ risk-bearing capacities and thus obstruct their efficiency.