

Improving income and nutrition with integrated farming systems

When land is a limited and scarce resource in agriculture, particularly on small and marginal farms, the scope to increase farm income, family food security and employment through crop production alone is not too wide. What are the alternatives to improve income and food security? The answer could be an integrated farming system in which livestock, poultry and piggery can play an important role and improve the nutrition status of the farm families.

Agriculture in India is dominated by a large number of smallholders with scattered fragmented holdings on marginal land. Lack of adequate capital for investment has been the major constraint, leading to a decline in agricultural production. Thus, production has to be diversified and crop production has to be integrated into the production of high-value commodities such as milk, meat, fish, fruits and vegetables. In view of risk and uncertainty in agriculture especially with high value commodities, a farming system approach should be discussed for Indian farmers. This would internalise the complementarities of all the natural resources to realise high productivity, sustainability, profitability, better nutrition and a low cost of production.

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Farmers' dependence on livestock besides arable farming as an alternative source of income is imminent. Preliminary estimates by the UN Food and Agriculture Organization (FAO) have revealed that nearly two out of three heads of a cattle population of 219 million thrive in the Indian drylands (FAO, 2000). Likewise, farmers also integrate sericulture (rearing of silkworms), horticulture (fruits, vegetables and flowers), silviculture (forests), aquaculture and other systems depending on the resources available on a farm.

Agricultural sector loses its significance

In 2007, the agricultural sector in India contributed just 16.6 percent to GDP and employed 52 percent of the total workforce, in a country in which agriculture has traditionally played a major role. This decline in the share of agriculture in the country's GDP (from 18.6 percent in 2005 to 16.6 percent in 2007) should not normally be a cause of concern for a country that is becoming industrialised. What is alarming is that this small share of income has to support a large percentage of the population, resulting in inequality in distribution of National Income. This also explains the higher incidence of poverty in the rural areas, where the high level of dependence on agriculture has led to unemployment and under-employment.

Cultivated area in India

Of the estimated 143 million hectares of net cultivated area in India, about 97 million hectares (68 %) is dryland, producing 44 percent of the country's food requirements and supporting 40 percent of human and 60 percent of livestock population (NBSSLUP, 2001). Even when the full irrigation potential of 139.5 million hectare is realised in agriculture by 2050, 75 million hectares will continue to be solely dependent upon rainfall (Kanwar, 1999). Of the 97 million farm-holders, 76 percent are small (< 2 hectares) and marginal, cultivating only 29 percent of the consolidated and scattered arable land.

The Farming System approach

A Farming System may be defined as an approach involving the allocation of a farm's available resources to its production enterprises, or different areas of production, such as crops or livestock rearing, in a manner that helps the attainment of the goals of maximisation of farm income, food security and employment. The ultimate goal of sustainable agriculture is to develop an appropriate farming system that is productive and profitable, conserve the natural resource base, protect the environment and enhance health and safety.

In the farming system approach, different enterprises compete for the scarce resources such as land, labour and capital on the farm while simultaneously being interdependent by supplementing or complementing each other.

Thus, it is necessary to deal with the farm approach as a whole to minimise risk and increase production and profit. To effectively put this concept into practice, it is necessary to understand the linkages and the mutual synergies of different enterprises in farming systems.

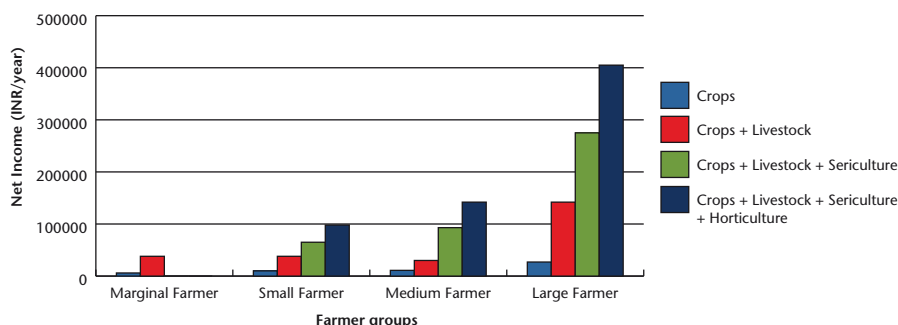
Farmers allocate certain quantities and qualities of the four factors of production that is land, labour, capital and entrepreneurial skills to which they have access, to the three processes i.e. crops, livestock and off-farm enterprises, in a manner which, given the knowledge they possess, helps in attaining the goals set (Norman 1978).

Indian agriculture is characterised by mixed farming, involving a system of combining crop production with one or more of the livestock enterprises, such as rearing of cattle, sheep, goats and poultry. Here, a farmer usually plans his farming system not only with the sole purpose of maximising the net returns but also to include family welfare in terms of family nutrition, risk aversion and assurance of returns from his individual enterprises. A farming system incorporating a wide scope of enterprises, like crops, dairy, poultry, horticulture and sericulture, may help a farmer achieve regular and safe employment opportunities throughout the year along with increased farm income.

■ The study

The present study was undertaken to estimate the impact of farming systems particularly on the net income and nutrition status of the farmers in four selected farming systems, like crops alone, crops + dairy farming, crops + dairy farming + sericulture, and crops + dairy farming + sericulture + horticulture in the Eastern Dry Zone of the southern Indian state of Karnataka. The farming system with crops alone was treated as a control farming system and compared with net returns and nutrition status of the other three farming systems.

Net returns from different farming systems (Indian rupees (INR)/year)



According to the National Sample Survey Office (NSSO) 1992, farmers are classified into four categories based on operational land holdings in India: Marginal farmers (owning < 1 hectare), small farmers (owning 1 to 2 ha), medium farmers (owning 2 to 5 ha) and large farmers (owning > 5 ha). In the Eastern Dry Zone of Karnataka, marginal farmers are practising two farming systems: crops, or crops with dairy farming. For every one unit of cost incurred in farming, a farmer received 1.83 units of benefit with crops and 2.06 units with crops and dairy. Marginal farmers were hampered in following an integrated farming system approach because of limited land and water availability along with minimum or no access to credit to invest into the farm. Small, medium and large farmers practised all four types of farming systems but with varying levels of benefits to the cost incurred.

As the figure above shows, the increase in net returns from farming is directly proportional to the level of integration on the farm. It is clearly evident that farmers with large land holdings and practising integrated farming systems with crop + dairy + sericulture + horticulture achieved a considerable level of net returns of 40,000 Indian rupees/year.

The integration of farming systems also has an impact on the intake of nutrients by farm families. Farmers practising integrated farming systems, though deficient in nutrient intake in the actual sense, were better off in comparative analysis. Farm

households with mono farming were deficient in almost all nutrients (except proteins and calcium) when compared with integrated farming systems. They showed satisfactory levels of proteins and calcium in their diet as it was mainly from their fields (subsistence farming). They consumed green leafy vegetables, cereals and pulses grown in their fields to live on. The results were in conformity with Engel's law for food in general and cereals in particular – (named after the German statistician Ernst Engel, Engel's law is an economic theory which states that the proportion



Photo: R. Mallegowda

Above: Livestock rearing helps a small farmer to reduce machinery costs required for farming.

Below: Farm women harvesting Crossandra to pack and market in a nearby town.



Photo: R. Mallegowda

of income spent on food decreases as the income increases, other factors remaining constant). The percentage of expenditure on high-value food items like milk, meat, egg and fruits increased as the income increased across farming groups.

■ Conclusion and recommendations

The transition of existing farming systems from subsistence to commercialisation calls for considerable attention. It increases and stabilises income from dryland horticulture (vegetables, fruits and floriculture) and other livestock enterprises (like dairy, sheep, poultry and piggery). Integration in turn helps reduce the risk of fluctuating income while also generating additional income and employment to farmers. Along with these benefits, integrated farming enterprises encourage the farm family to consume the farm products (fruits, milk, meat and egg), in turn improving their nutritional status. This also reduces expendi-

ture on illness and keeps the farm family in good health.

The Government of India has actively supported integrated farming systems through many policies, schemes and rural development programmes. However, success achieved in policy implementation has been modest. An effective and efficient implementation of the policies requires a collaborative effort by different institutions and persons, as Non-Governmental Organisations, farmers' organisations, agriculture extension service personnel and government bodies. Keeping livestock and poultry has to be integrated with women's empowerment through creating awareness among farmers. Also there is an urgent need to provide farm incentives, technology and extension support if integrated farming systems are to be widely adopted across the country.

A full list of references can be obtained from the author or at:
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Zusammenfassung

Die indische Landwirtschaft ist durch eine Vielzahl von Kleinbauern mit zerstreuten, kleinteiligen Ländereien geprägt. Fehlt das Kapital für Investitionen hemmt die Entwicklung. Angesichts der Risiken und Unsicherheiten in der Landwirtschaft, insbesondere in Bezug auf hochwertige Rohstoffe, erweist sich die Einführung eines Bewirtschaftungssystems, das den Anbau von Feldfrüchten beispielsweise mit Viehzucht und Holzbewirtschaftung kombiniert, zunehmend als wichtige und wirksame Strategie zur Bewältigung der Probleme. Im Mittelpunkt der in diesem Artikel vorgestellten Studie stand eine Untersuchung über die Auswirkungen verschiedener Bewirtschaftungssysteme auf das Einkommen, mit besonderem Augenmerk auf Ernährungssicherung und Verteilungsgerechtigkeit. Die Ergebnisse zeigten, dass das integrierte Bewirtschaftungskonzept (Landwirtschaft + Gartenbau + Seidenraupenzucht + Viehhaltung) eine der besten Alternativen für die Verbesserung der Einkommens- und Ernährungssituation in der ländlichen Wirtschaft ist.

Resumen

La agricultura india está dominada por un gran número de pequeños propietarios agrícolas con propiedades dispersas y fragmentadas. La falta de capital adecuado para la inversión ha representado un grave obstáculo. En vista del riesgo y la incertidumbre en la agricultura, en especial con respecto a los productos primarios de alto valor, la adopción de un enfoque de sistemas agrícolas que integra la producción de cultivos con – por ejemplo – la crianza de animales y la agro-silvicultura se ha convertido en una estrategia importante y eficaz para superar las dificultades. El principal enfoque del estudio que se presenta en este artículo fue el de analizar el impacto de diversos sistemas agrícolas sobre el ingreso, con énfasis en investigar la brecha en la seguridad nutricional y la inequidad en general. Los resultados indican que el sistema agrícola integrado (agricultura + horticultura + sericultura + crianza de animales) es una de las mejores soluciones alternativas para fortalecer la economía rural en términos de los niveles de ingresos y la situación nutricional.

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