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Enhancing Productivity and Resource Use Efficiency of Rice-Fallow through Introduction of Pulses

Mukesh Choudhary[1]*, P. C. Ghasal[1], G. L. Choudhary[1], Kailash Prajapat[1] and H. R. Choudhary[2]

[1]Division of Agronomy, [2]CESCRA

Indian Agricultural Research Institute, New Delhi 110 012

***Email of corresponding author: selmukesh@gmail.com**

In India, about 12 m ha kharif rice field remains fallow in the subsequent rabi season. This area is mainly confined to eastern, central and central peninsula of India offers enormous opportunities to enhance pulses production. Introduction of pulses in these areas may bring green revolution in this backward, poverty-ridden and deprived region of the country. Promotion of pulses in the existing fallow area would also improve sustainability of the rice production system besides enhancing production and augmenting income.

Introduction

India is second largest rice producing country of the world. A substantial proportion of this area is under only a single crop, usually *kharif* (rainy) season rice, with the land being left fallow during the following *rabi* (post-rainy) season. About 30% of 40 m ha (12 million ha) area of *kharif* rice in India remains fallow in the subsequent *rabi* season. This is almost equivalent to the net sown area of Punjab, Haryana, and western Uttar Pradesh – the seat of green revolution in India. Of the total rice fallow area about 82% lies in the Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, and West Bengal. This situation largely occurs for rainfed rice, where irrigation facilities for either rice or a post-rice crop are not available. These rice-fallows can be used to grow an additional crop to utilise the moisture still retained in the soil. This unutilized area offers enormous opportunities to strengthen food and nutritional security. India is deficit in pulses and imports 2-3 mt to meet the domestic pulses demand. Introduction of pulses in the existing fallow area would enrich the fertility status of the soils by fixing atmospheric nitrogen and adding organic matter. They help in sustaining the rice-based cropping systems by breaking pest and disease cycles associated with sole rice systems. They also enhance the microbiological activity and thereby increasing the nutrient availability in the soils following rice.

Pulses in India have long been considered as the poor man's only source of protein. During 2012-13, pulses are grown on 23.3 million hectares of area with an annual production of 18.3 mt. India accounts for 33% of the world area and 22% of the world production of pulses. Due to stagnant production, the net availability of pulses has come down from 60 gm in 1951 to 41.7 g/day/person in 2012 (Indian Council of Medical Research recommends 65 g/day/capita). Depending on the domestic shortfall in pulses production, India's net imports of pulses have ranged from 1-3 mt. Pulses shortfall may increase to 6.8 mt by 2020-21. Overall, the above

figures indicate that India needs to increase domestic production of pulses either through increase in area or productivity. Area can be increased by brought rice-fallow under pulses cultivation.

Limiting Factors for Rice-Fallow

A number of agro-ecological and socio-economic factors are limiting utilization of rice-fallow for crop production. These factors are:

Lack of irrigation facilities: It is difficult to cultivate rabi crops without irrigation and most of them indicated a lack of capital to invest in on-farm irrigation facilities.

Cultivation of long duration varieties: Long-duration varieties often suffer most from terminal drought.

Fast receding of residual moisture: During kharif season water table is generally high but as the monsoon rains withdraw, the water table recedes very fast leading to low moisture content in the soil after rice harvest.

Soil hardiness and development of cracks: After harvest of puddled rice, soil becomes hard. In this situation sowing of rabi crops become difficult. As soil dries, cracks appears leads to loss of soil moisture. Soils of rice-fallow also faces problem of salinity and alkalinity.

Inadequate and uncertain winter rains: Rainfall is inadequate and uncertain, and even if the crop has established well utilizing available soil moisture, lack of rabi rainfall towards harvesting stage creates drought conditions leading to crop failure.

Stray cattle: When a considerable proportion of land remains fallow, domestic animals are often left to graze freely. This is a common practice in the region and is likely to be a major threat to rabi crop production at least until a sizeable proportion of the fallow land is brought under cultivation.

Why Promoting Pulses in Rice-Fallow?

- **Low input requirement**: Pulses are grown on marginal lands with low soil fertility and require less amount of nutrient particularly nitrogen due to its biological N fixation capacity. In addition to nutrients it requires less irrigation compare to other cereal crops.
- **Ability to establish with surface seeding**: Pulses have the ability to establish with surface seeding in standing rice crop. So, it is best suited for relay cropping for utilization of conserved soil moisture.
- **Sustainable rice based production**: Continuous growing of rice as mono culture led to degradation in soil fertility and environment. Weeds also emerge as major problem in these rice areas. Introduction of pulses in rice-fallows improve soil fertility and sustainability of rice based production system.
- **Meeting shortfall of pulse production**: Due to stagnant production, the net availability of pulses has come down from 60 g/day/person in 1951 to 41.7 g/day/person in 2010. Depending on the domestic shortfall in pulses production, India's net imports of pulses have ranged from 2-3 mt. Introduction of pulses in rice-fallows areas not only increase the production but also reduce dependency on import of pulses.
- **Nutritional security**: Accomplishing household food security remains the primary concern though at the national level. India has piled up a huge stock of foodgrains, mainly rice and wheat. Pulses are critical to food security. Nutritional security is equally important. Rice-fallows area offers enormous opportunities to overcome the problem of food and nutritional insecurity.

Production System in Rice-Fallow

There are two production systems of pulses in rice-fallows, relay cropping and rice-fallow pulses system. In relay cropping, pulses are grown in standing crop of rice by broadcasting seeds. This system is also known as *paira* in Bihar and *uttera* in M.P. and Chhattisgarh. This system is widely practiced in West Bengal, M.P., Bihar and Chhattisgarh. Rice-lentil, rice-lathyrus and rice-blackgram are dominant relay cropping system under rice-fallow areas.

In rice-fallow pulses system, pulses are sown after harvesting of rice crop. Before sowing, field was ploughed. In this operation generally next crop delayed for sowing resulting low soil moisture and terminal drought led to low yield.

Interventions to Promote Rainfed *Rabi* Cropping in the Rice-Fallow Systems

- Introduction of short-duration varieties of pulses capable of escaping the terminal drought
- Introduction of short-duration varieties of rice to enable farmers to sow *rabi* crops on residual moisture in time or promote early sowing of rice, whichever is feasible.
- Green manuring and application of FYM in rice crop
- Timely seed broadcasting and enhanced seed rate of pulses under paira system
- Strengthen farmers' access to information on *rabi* crops and their cultivation practices by strengthening the agricultural extension system.
- Improve farmers' access to improved seeds and critical inputs.
- Technological efforts to overcome production risk may be accompanied by implementation of area-wise crop insurance scheme.
- Seed priming

Conclusion

Pulses have tremendous scope for area expansion in rice-fallow, considering the food and nutritional security. Residual soil moisture needs to be conserved to accommodate pulses in rice-fallows for higher productivity and profitability.

References

Economic Survey. 2013-14. A flagship annual document of the Ministry of Finance, Government of India.

Joshi PK, Birthal, PS and Bourai, VA. 2002. Socioeconomic constraints and opportunities in rainfed *rabi* cropping in rice-fallow areas of India. International Crops Research Institute for the Semi-Arid Tropics, Patancheru 502 324, Andhra Pradesh, India. p. 58.

Kar G, Singh R and Kumar A. 2008. Evaluation of post rainy season crops and response to irrigation in rice (*Oryza sativa*) fallow under shallow water-table of eastern India. *Indian Journal of Agricultural Sciences* **78**(4): 293-298.

Pande, S, Sharma M, Ghosh R, Rao SK, Sharma RN and Jha AK. 2012. Opportunities for chickpea production in rainfed rice-fallows of India – Baseline survey report. International Crops Research Institute for the Semi-Arid Tropics Patancheru 502 324, Andhra Pradesh, India. p. 56.

Subbarao GV, Kumar Rao JVDK, Kumar J, Johansen C, Deb UK, Ahmed I, Krishna Rao MV, Venkataratnam L, Hebber KR, Sai MVSR and Harris D, 2001. Spatial distribution and quantification of rice-fallows in South Asia-potential for legumes. ICRISAT, Patancheru 502324, Andhra Pradesh, India. p. 316.