

Science IMPACTS

The Challenge:

India is globally the largest consumer of pulses with millions, particularly the poor, dependent on them for food and nutrition. It is also the largest importer of pulses and faces increasing dependence on imports as pulses demand is projected to increase 1.5 fold by 2030. The growing shortage has raised pulses prices making them unaffordable for most in India.

Tapping Rice Fallows to Boost Pulses Production in India

Short duration and higher-yielding lentil varieties are enabling farmers to reap lentil harvest from rice fallows, opening new doors to boost pulses production in India.

Pulses productivity in India has remained significantly low, an average of 0.75 tonne/hectare (t/ha), compared to the world average of 0.91 t/ha. With limited technology advances and policy support, pulses production has lagged behind, growing only 45% over a period of 1951-2008, while wheat and rice production grew by 320% and 230%, respectively, over the same period.

The rice fields in rainfed systems of eastern and central region in India remain fallow in the winter months, offering a window for farmers to grow short duration pulses like lentil, grasspea and chickpea. An estimated 3.0 million ha of these fallows can be targeted for producing pulses, sustainably intensifying cereal-based cropping systems. The approach will boost national pulses production, provide additional income to farmers and ensure nutrition for rural families, while also making the soils healthier.



Project Implementation

ICARDA has been working with the Indian Council of Agricultural Research (ICAR), Department of Agriculture & Cooperation, State Agricultural Universities and state research institutes to expand lentil production by tapping the rice fallows in east and north east regions of India. The research for development partnership has focused on addressing the varied challenges faced by the farmers in utilizing their fallow lands. First and foremost, the lentil varieties needed to be short duration – less than 110 days – to fit into the narrow planting window. The yield of lentil crops is particularly challenged by weed infestation, high incidence of disease, and water stress in the region, made worse by restricted irrigation facilities. The timely availability of quality seed has been another major bottleneck.

The partnership led by ICARDA developed new high-yielding, disease-resistant varieties that mature in just 100-110 days. Research also focused on optimizing crop management technologies such as zero tillage, treating seed with rhizobium and fungicides, seed sowing rates, and fertilizers and insecticides application and upscaling of these technologies. The project worked with national partners to reach farmers with training and improved lentil technology packages, aiming to cover vast areas of rice fallow lands and replace the indigenous/local lentil varieties with improved varieties preferred by farmers in participatory selection.

Varieties like 'HUL-57', 'Moitree', 'Malika', and 'Subrata' performed well, yielding up to 1.1 t/ha in rice fallows. Quick-growing with robust root system, they also offer small-seed trait preferred by consumers.

A major focus of the interventions was establishing village-based seed enterprises to meet direct demand of farmers at village level, driving both self-sufficiency and entrepreneurship. Alongside these activities, the project conducted numerous field days, training workshops and visits to build capacity of extension personnel and farmers in lentil production technologies and quality seed production.

Impact on ground

The project reached over 6000 farmers with improved lentil technologies and training from 2013 to 2015, resulting in coverage of 1026 ha of rice fallows with improved varieties of lentil.



I never thought in my dream that this piece of fallow land could give me such returns.

- **Meghlal Burman, a tribal farmer (West Bengal) and first time lentil grower.** Burman produced 110 kg lentil in his 0.14 ha land. He kept aside 7 kg as seed material for next year's cultivation and the rest for his family consumption.

Of particular note, some 636 farmers in north eastern states cultivated lentil for the first time in their fields in 2014-2015. The project also established eight village seed hubs involving farmers in seed production as an enterprise for producing quality seed.

The improved lentil technologies are demonstrating varying yields across different project sites, reaping more than



Lentil crop growing next to land left fallow in West Bengal

double the national average in West Bengal at 1.5 t/ha. Relay cropping and use of zero tillage are proving to be even more advantageous, e.g., in Jehanabad, Bihar, farmers using improved technology package with zero tillage reaped 42% higher yield and increased their income by 60% (including saving in fuel costs).

Scaling out nationwide and beyond

The project is currently working on reaching more and more farmers with optimized lentil technology packages, backed by the Indian Ministry of Agriculture through its National Food Security Mission – Pulses initiative. The new technologies can successfully produce lentil on an estimated 1.0 million ha of rice fallows. The lentil technologies are also being implemented simultaneously in Bangladesh and Nepal, with support from OPEC Fund for International Development, and

In Birbhum in West Bengal, vast areas remain fallow after rice harvest. Farmers received lentil seeds for the first time through ICARDA's partnership with a local NGO, "Manab Jamin." More than 100 farmers grew improved lentil varieties, 'Subrata' and 'Moitree', reaping 610-1100 kg/ha from their fallow lands (project funded by OCP Foundation).

have already reached 114 ha and 219 ha of fallow areas respectively. Further, ICARDA has established a Global Pulses Research Platform in Madhya Pradesh state to intensify efforts for pulses technology development and delivery and build national capacity to increase the region's pulses production.

Donors

Indian Council of Agricultural Research and National Food Security Mission – Pulses, Ministry of Agriculture, Government of India

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