

Lentil for Rice-based Cropping Systems in South Asia

ABSTRACT

Short duration varieties of lentil offer opportunities for intensification of rice based cropping systems in South Asia. ICARDA in collaboration with NARS partners in Bangladesh, India and Nepal have developed lentil varieties with early maturity and resistance to Stemphylium blight, Fusarium wilt and rust. Improved varieties (BARI Masur 4, BARI Masur 5, BARI Masur 6, BARI Masur 7, BARI Masur 8 in Bangladesh; Moitree, HUL 57 and IPL316 in India; Sheetal, Sagun and Khajura 3 in Nepal) coupled with good agronomic practices were demonstrated in target regions. This coupled with farmers participatory seed production and capacity building of NARS partners including farmers has more than doubled lentil production in Bangladesh from 80,442 tons in 2011 to 167,261 tons in 2015.

INTRODUCTION

- Lentil is an important grain legume crop in South Asia for consumption.
- About 14 m ha area in South Asia remains fallow after rice harvest.
- Short duration varieties of lentil with resistance to key diseases offer scope to grow an extra crop after rice harvest while extra early varieties (<90 days) provide opportunity for introducing lentil in a short season window available between rice and *boro* rice.
- ICARDA along with NARS partners of Bangladesh, India and Nepal has directed research for development activities for promotion of improved varieties of lentil with good agronomic practices in rice based systems.

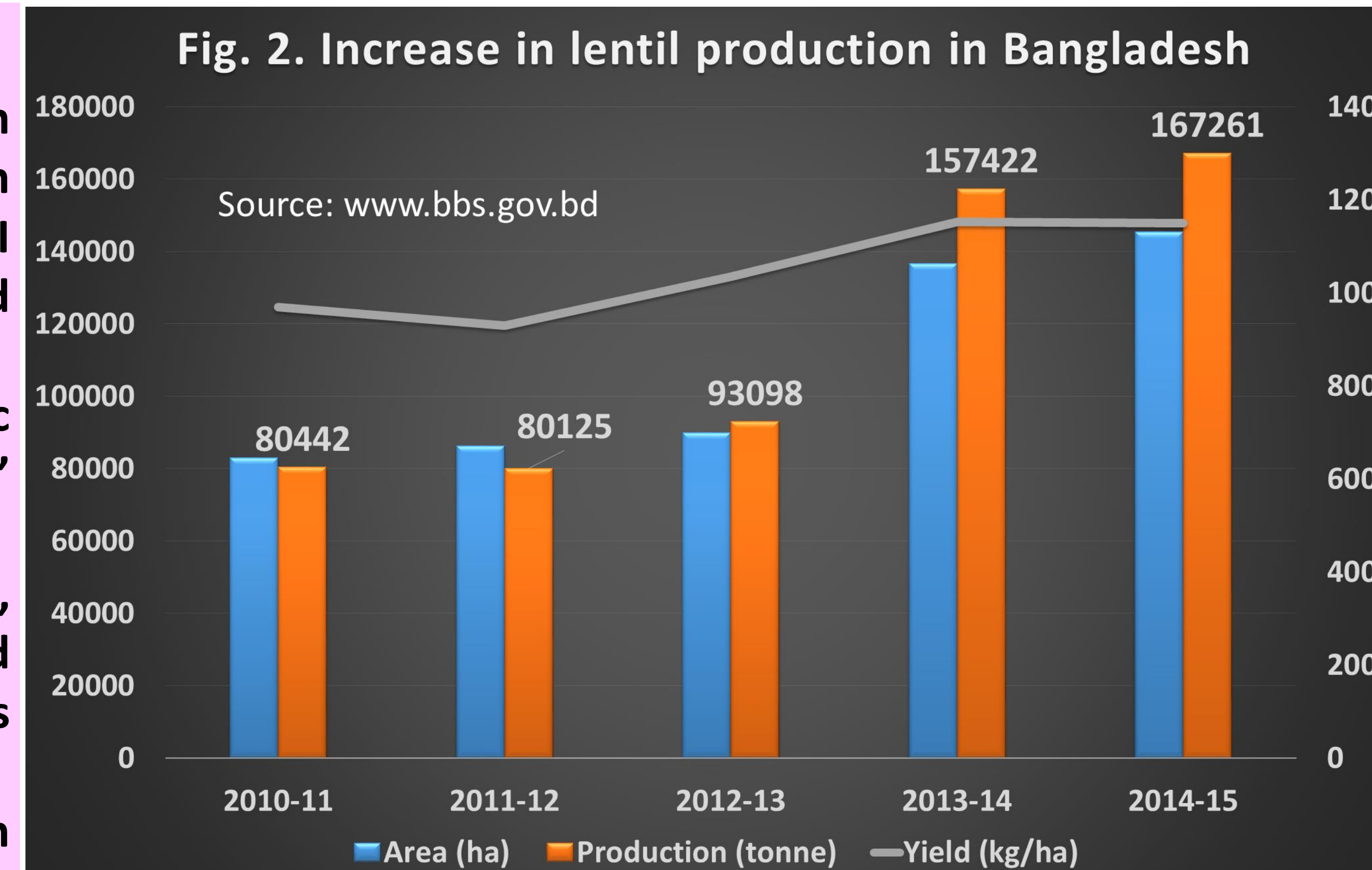
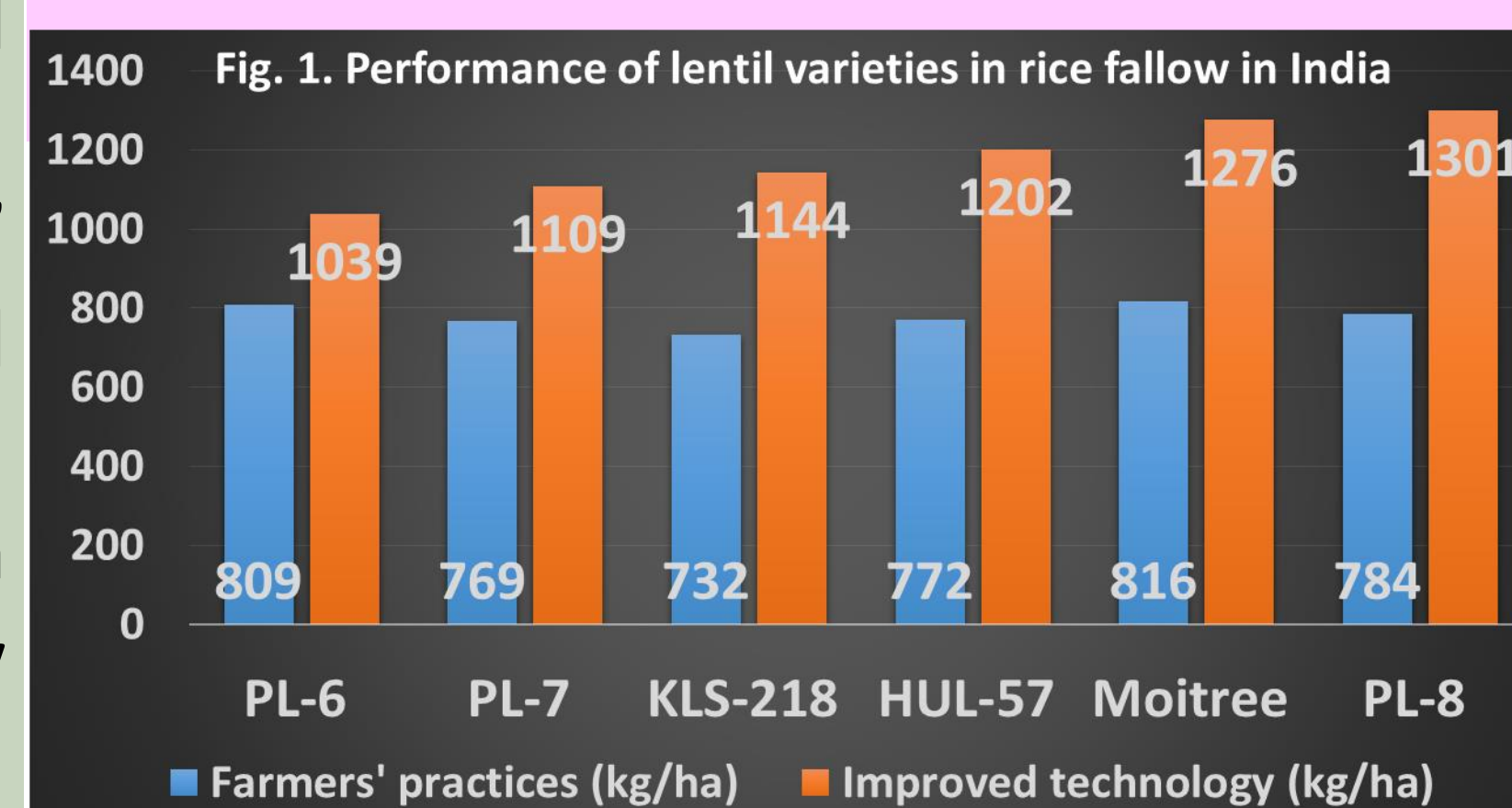


MATERIALS AND METHODS

- Breeding cycle of selection-hybridization-selection-evaluation was adopted to develop early (90-110 days) and super early (80-90 days) small seeded red lentil varieties with resistance to Stemphylium blight, Fusarium wilt and rust.
- Improved varieties coupled with good agronomic practices were tested under rice systems in target regions of Bangladesh, India and Nepal.
- Massive frontline demonstration, farmers' day, field visits and farmers' training were undertaken for knowledge empowerment of farmers and extension workers.
- For large-scale adoption of improved varieties and production technologies, farmers participatory seed production and capacity building of NARS partners were organized.

RESULTS

- Short duration varieties of lentil with resistance to Stemphylium blight, rust and Fusarium wilt were developed and released in Bangladesh (BARI Masur 4, BARI Masur 5, BARI Masur 6, BARI Masur 7, BARI Masur 8), India (Moitree, HUL 57, IPL 316) and Nepal (Sheetal, Sagun, Khajura3).
- Demonstration of improved varieties with good agronomic practices have shown up to 60% yield advantage over farmers' practices (Fig. 1).
- Knowledge empowerment of farmers through field visits, interaction and training coupled with farmers participatory seed production has led to large-scale adoption of improved varieties and production technology in target regions.
- During the last four years (from 2011 to 2015), lentil production has increased in Bangladesh from 80,442 to 167,261 tons (Fig. 2) and in target states of India (Assam, Bihar, Chhattisgarh, Madhya Pradesh and West Bengal) from 462,000 to 705,600 tons. Large-scale adoption of improved varieties has made Nepal a lentil exporting country in South Asia.
- Improved varieties has spread to >85% of lentil area in Bangladesh, bringing an additional annual income of US\$ 26.6 million.
- Breeding lines, IPL 534, L 4717 and RKL 607-01 maturing in 100-105 days are under multi-environment testing in India.
- A new source for extra earliness (less than 90 days to maturity) has been recovered from a wild accession, ILWL 118 which has been deployed for development of super early cultivars.



DISCUSSIONS

- South Asia has one-fourth of the world's population but only one-twentieth of the world's land.
- To ensure food security in the region, there is only one option – produce more food from every piece of arable land.
- Early maturing cultivars of lentil along with improved management practices has proven its potential in Bangladesh, India and Nepal in augmenting food and nutritional security.
- The key scientific enabler in establishing rice-lentil system has been short duration varieties with resistance to key diseases.
- For small holder farmers numbering ~1 million, obtaining a harvest of lentils from the same piece of land has not only improved their livelihood but also nutrition for their families.
- Efforts are underway towards the development of super early cultivars (<90 days) through pre-breeding for rice-lentil-boro rice system.

REFERENCES

- Kumar J (2016) Journal of Food Legume 28 (4): 349-350

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