

Importance of Legumes in the Cropping Systems in Pakistan



Wheat and rice are the main staples of Pakistan, yet the food legumes are of strategic importance for the economy and for human nutrition. Grain legumes are referred to as “gold from the fields” as they are the cheapest source of high-quality protein that can help the poor in combating malnutrition. They are also vital in restoring and building soil health, particularly in rice-wheat areas as the productivity of this system is declining. The beneficial effects of including legumes in cereal-based cropping systems, whether on succeeding or companion crops, depend on the legume species, the purpose for which they are grown (seed, fodder, green manure), and the management practices followed. Short-duration legumes can fit well into the existing cropping systems such as rice-wheat, as they are drought-tolerant and adapted to low-input situations. In Pakistan, both winter legumes and summer legumes are included in the rice-wheat cropping system.

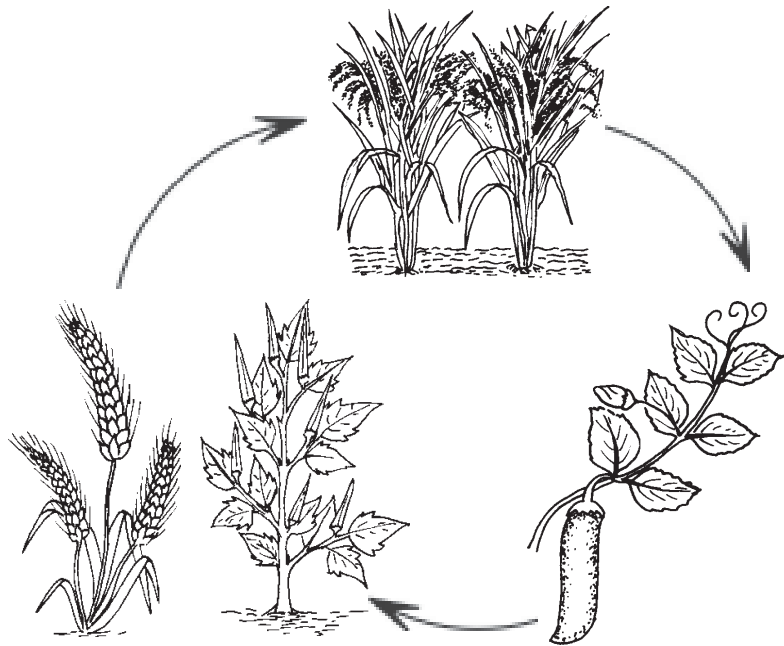
Winter Legumes in Rice-Wheat System

In Sind and Baluchistan in Pakistan, chickpea, lentil and lathyrus (on large scale) and in Punjab and North-West Frontier Province (NWFP), chickpea and lentil (on small scale) are grown after rice on residual moisture and fit very well into the rice-wheat systems as alternatives to wheat. Chickpea is generally grown as a relay crop in the standing rice crop in Sind and Baluchistan. Rice-chickpea rotation gives maximum monetary



return, followed by rice-lentil and rice-lathyrus rotations. However, for the rice-chickpea system in the traditional rice belt in Punjab, high-yielding, early-maturing, ascochyta blight resistant chickpea varieties and better management options with effective pod borer control are needed.

With the availability of irrigation facilities, lentil has been replaced by wheat in some districts (e.g., Sialkot) of Punjab. Lentil can be reintroduced by using rust-resistant, early-maturing cultivars along with appropriate weed control measures. Short-duration varieties of lentil may give better return than wheat planted in December. Lentil can also be intercropped with wheat or September-planted sugarcane.



The rice-pea-okra + wheat cropping pattern is practiced in Sheikhupura district. Farmers grow short-duration, non-aromatic rice from June to September and pea from end of September to early December.

Lathyrus and berseem are important winter fodder legumes of the rice-wheat systems and are commonly rotated with rice. Small landholders in Sind prefer to grow lathyrus as it is hardy and tolerant to drought, waterlogging and salinity, and the cost of production is low. Lathyrus seeds can be broadcast even in standing water of ricefields whereas some other crops can be planted only very late after rice harvest when land becomes available for succeeding crops. This relay-cropped lathyrus can also be used as an effective green manure for the succeeding wheat crop.

Berseem serves dual-purpose when intercropped with sugarcane planted in September. One or two cuttings of berseem are first harvested as green fodder for livestock and later plowed in as green manure for the standing sugarcane crop.

The rice-berseem-rice rotation is important in the rice belt of Punjab and NWFP because of its multipurpose nature. Besides being a valuable fodder, berseem also improves soil fertility and suppresses weeds and thus acts as an excellent means of weed control for subsequent rice and wheat crops.

Summer Legumes in Rice-Wheat System

Mungbean and black gram are important summer and rainy season legumes of Pakistan. Cowpea is also cultivated on a very small area primarily for fodder. These crops are mainly grown on marginally fertile soils of rainfed areas. But in irrigated areas, short-duration and photoperiod-insensitive cultivars of these crops have good potential.

Scope for Mungbean Expansion

Mungbean area can be further expanded in Pakistan through the potential cropping systems: mungbean-rice-wheat and cotton-sunflower-mungbean-wheat. In Bahawalpur area, sunflower is planted during January after cotton and harvested in May/June. There is a fallow period from July to October and wheat is planted in October/November. Mungbean can be successfully grown in this cropping system during the fallow period.

New Cowpea Varieties Needed

Cowpea offers very little scope for inclusion in rice-wheat system but it has a large scope as pre-rice crop especially in the rice-growing areas of Punjab. For this cropping pattern, short-duration (60 to 65 days), photoperiod-insensitive cowpea varieties having high grain or fodder yield and resistance to yellow mosaic and other diseases are needed so that these can be sown after wheat. No such cowpea variety that could fit in the rice-cowpea-wheat cropping pattern is available at present in Pakistan. Collection and evaluation of cowpea germplasm and a strong hybridization program to develop such varieties are needed at both federal and provincial levels.



Short-duration Mungbean

Mungbean cultivation in the rice-wheat system is practiced in a small area. Limited availability of short-duration (60 to 70 days), photoperiod-insensitive, and heat-tolerant mungbean cultivars to grow in the short period between harvest of wheat and planting of rice limits the adoption of this practice. Shortage of irrigation water is a common constraint as mungbean requires at least two irrigations during this hot period for good yield. However, few disease and insect problems occur in summer or pre-rice mungbean.

Short-duration Black Gram

Black gram cultivation is carried out in those areas of the rice-wheat system where water supply is scanty or which depend on rains. Its cultivation is impeded due to non-availability of high-yielding, photoperiod-insensitive, and short-duration cultivars. Short-duration black gram cultivars can be intercropped with maize or sorghum, particularly in rainfed areas where it serves as a cover crop to conserve moisture.

Green Manure Legumes in Fallows

The fallow period of 60 to 70 days between wheat and rice crops can be effectively used for cultivation of fast-growing, green manure legumes. But growing a green manure crop before wheat is not possible as there is only a very short turn-around period for land preparation after rice harvest. *Sesbania aculeata* is a potential green manure legume for the rice-wheat system in Pakistan. It is raised for eight to nine weeks as pre-rice crop and incorporated into the soil during the puddling operation of rice transplanting in July. *Sesbania* green manure increases yields of succeeding crop, but the increase is more in rice than in wheat. *Sesbania rostrata* produces more biomass and accumulates more nitrogen than *Sesbania aculeata*.

Sunnhemp and cluster bean are also grown occasionally for green manure. However, green manure crops are not grown at present due to high labor cost and shortage of irrigation water. Also, it is difficult to fit these crops into prevailing cropping systems without disturbing a remunerative spring crop (e.g., spring maize and fodder crops). A good plant stand establishment of these crops at low cost is essential for the economic viability of such cropping systems.

Adapted from:

Haqqani, A.M., M.A. Zahid and M.R. Malik. 2000. Legumes in Pakistan. pages 98–128. In: Johansen, C., J.M. Duxbury, S.M. Virmani, C.L.L. Gowda, S. Pande and P.K. Joshi (eds). Legumes in Rice and Wheat Cropping Systems of the Indo-Gangetic Plain: Constraints and Opportunities. ICRISAT, Patancheru, India; and Cornell University, New York, USA.

Corresponding author:

A. M. Haqqani