

Rice Based Cropping Systems under Irrigated Condition for Crop Diversification and Intensification: A Review

M. K. Tarwariya^{1*} and B. M. Mauraya²

¹Deptt. of Agronomy, RVSKVV, Gwalior

²Deptt. of Agronomy, JNKVV, Jabalpur

*Corresponding Author E-mail: manojtarwariya@gmail.com

Received: 12.11.2017 | Revised: 19.12.2017 | Accepted: 24.12.2017

ABSTRACT

Rice is one of the staple food for billions of people in Asia, Africa and Latin America. Estimated Global area of rice is 164.7 million ha. Globally, rice ranks second to wheat in terms of area harvested, but first in terms of calories per hectare (18% of total kilocalories per person per day. Often low volume high-value crops like spices also aid in crop diversification. Higher profitability resilience/stability in production also induces crop diversification. Agriculture become drought proof and growth become more regionally balanced; there has been a reduction in the instability of agricultural output.

Key words: Food, Cropping system, Wheat, Rice, Agriculture

INTRODUCTION

Rice is one of the staple food for billions of people in Asia, Africa and Latin America. Estimated Global area of rice is 164.7 million ha (FAO, 2013). In 2016-17, the estimated production of rice was 482 million tonnes in India the production was 106.5 million tonnes⁵. India stands first in terms of area under cultivation and second in rice production after China¹. Among the crop rotation, rice-wheat is the major cropping system in south Asian countries that occupies about 13.5 million hectares in the Indo-Gangetic Plains (IGP), of which 10 million hectares are in India. This is dominant in most Indian states, such as Punjab, Haryana, Bihar, Uttar Pradesh and Madhya Pradesh, cropping system contributes 75% of the national food grain

production. On an average, the world yields of 1 ha of rice could sustain 5.7 persons per year compared to 4.1 persons per year for wheat. Globally, rice ranks second to wheat in terms of area harvested, but first in terms of calories per hectare (18% of total kilocalories per person per day⁴. Rice and wheat are the important crops of Madhya Pradesh which occupy 16.03 lakh hectares and 45.72 lakh hectares respectively with the production of rice 17.72 lakh tonnes and wheat 90.47 lakh tonnes, respectively. The average productivity of rice is 1167 kg/ha and wheat is 2065 kg/ha.³ In this system rice is grown in the warm region, summer months and wheat in the cooler, winter season. Both cereals are grown once in calendar year.

Cite this article: Tarwariya, M.K. and Mauraya, B.M., Rice Based Cropping Systems under Irrigated Condition for Crop Diversification and Intensification: A Review, *Int. J. Pure App. Biosci.* 5(6): 1701-1703 (2017). doi: <http://dx.doi.org/10.18782/2320-7051.6045>

Approaches of Crop Diversification

(A) Horizontal diversification: 2 types

(a) Crop intensification: Addition of more crops to the existing cropping system as a way to improve the overall productivity of a farm or region's farming economy.

Eg: intercropping, mixed cropping, sequential cropping, multi tier cropping

(b) Crop substitution: Substituting less suitable crops with more suitable alternate crops depending on the agro climatic conditions of the area.

- Shifting high risk crops with short duration pulses and drought resistant oilseeds crops.
- Enough elasticity can be kept in rotation so that if pest or diseases destroys a crop, another crop can be substituted.

(B) Vertical diversification: Farmers and others add value to products through processing, regional branding, packaging, merchandising or other efforts to enhance the product. Crop diversification is intended to give a wider choice in the production of a variety of crops in a given area so as to expand production related activities on various crops and also to lessen risk. Crop diversification in India is generally viewed as a shift from traditionally grown less remunerative crops to more remunerative crops. The crop shift (diversification) also takes place due to governmental policies and thrust on some crops over a given time, for example creation of the Technology Mission on Oilseeds (TMO) to give thrust on oilseeds production as a national need for the country's requirement for less dependency on imports. Market infrastructure development and certain other price related supports also induce crop shift. Often low volume high-value crops like spices also aid in crop diversification. Higher profitability and also the resilience/stability in production also induce crop diversification, for example sugar cane replacing rice and wheat. Crop diversification and also the growing of large number of crops are practiced in rainfed lands to reduce the risk factor of crop failures due to drought or less rain. Crop substitution and shift are also taking place in the areas with distinct soil problems. For example, the

growing of rice in high water table areas replacing oilseeds, pulses and cotton; promotion of soybean in place of sorghum in vertisols (medium and deep black soils) etc.

PATTERNS OF CROP DIVERSIFICATION

The crop pattern changes, however, are the outcome of the interactive effect of many factors which can be broadly categorized into the following five groups:

- a) Resource related factors covering irrigation, rainfall and soil fertility.
- b) Technology related factors covering not only seed, fertilizer, and water technologies but also those related to marketing, storage and processing.
- c) Household related factors covering food and fodder self-sufficiency requirement as well as investment capacity.
- d) Price related factors covering output and input prices as well as trade policies and other economic policies that affect these prices either directly or indirectly.
- e) Institutional and infrastructure related factors covering farm size and tenancy arrangements, research, extension and marketing systems and government regulatory policies.

CONCLUSIONS

Rice is the most important crop in Asia. However, in marginal areas, rice-based cropping systems have relatively low returns. Improving the current cropping systems to enhance their sustainability to the extent possible, and shifting marginal areas out of rice into other more profitable crops is seen as a solution. Alternatively, flexible cropping systems for upland farmers that feature production of more income elastic India, being a vast country of continental dimensions, presents wide variations in agroclimatic conditions. Such variations have led to the evolution of regional niches for various crops. Historically, regions were often associated with the crops in which they specialize for various agronomic, climatic, hydro-geological, and even, historical reasons. But, in the

aftermath of technological changes encompassing bio-chemical and irrigation technologies, the agronomic niches are undergoing significant changes. With the advent of irrigation and new farm technologies, the yield level of most crops- especially that of cereals has witnessed an upward shift making it possible to obtain a given level of output with reduced area or more output with a given level of area and creating thereby the condition for inter-crop area shift (diversification) without much disturbance in output level. Besides, as agriculture become drought proof and growth become more regionally balanced, there has been a reduction in the instability of agricultural output.

REFERENCES

1. Pippal, A., Rajinder K. Jain and Sunita Jain. Rice Biofortification for Assessment of Hidden Hunger: A Review (2017).
2. Agriculture Commissioner, Department of Agriculture and Cooperation, Ministry of Agriculture, Krishi Bhawan, New Delhi, India (2016).
3. Anonymous, Statistics of main crops in M.P. Krishak Doot Diary 101(2012).
4. Mahajan and R.D. Gupta, Integrated Nutrient Management (INM) in a Sustainable Rice-Wheat Cropping System, © Springer Science + Business Media B.V (2009).
5. United State Department of Agriculture (2017).