

Rice Productivity in India under Variable Climates

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Rice is the most important cereal food crop of India. It occupies about 23.3% of gross cropped area of the country and plays vital role in the national food grain supply. Rice contributes 43% of total food grain production and 46% of the total cereal production of the country. It is the staple food of more than 60% of the world's population especially for most of the people of South-East Asia. Among the rice growing countries in the world, India has the largest area under rice crop and ranks second in production next to China.

Rice production in India has increased during the last 61 years by nearly 4.1 times from 20.58 million tonnes in 1950 to nearly 84.6 million tonnes during 2008-09. There is considerable increase in productivity of rice in India during the recent past. The increase in productivity of Rice is due to introduction of high yielding rice varieties responsive to high dose of fertilizers coupled with improved package of practices evolved by Agricultural Scientists for various regions. In fact, there is considerable increase in productivity of rice in the country but there are still certain areas, where rice productivity is very low. Rice productivity in such areas fluctuates significantly from region to region due to various factors such as soil type, soil fertility, rainfall pattern, flood, water logging, climatic conditions etc.

In India rice is grown under widely varying conditions of altitude and climate. Therefore, the rice growing seasons vary in different parts of the country, depending upon temperature, rainfall, soil types, water availability and other climatic conditions. In eastern and southern regions of the country, the mean temperature is found favorable for rice cultivation through out the year. Hence, two or three crops of rice are grown in a year in eastern and southern states. In northern and western parts of the country, where rainfall is high and winter temperature is fairly low, only one crop of rice is grown during the month from May to November. There are three seasons for growing rice in India viz.- autumn, winter and summer. These three seasons are named according to the season of harvest of the crop. Autumn rice is known as pre-kharif rice. The sowing of pre-kharif rice is taken up during May to August. However, the time of sowing slightly differs from state to state according to weather condition and rainfall pattern. It is harvested in September-October. About 7% crop is grown in this season. The varieties grown during this season are mostly varieties of short duration ranging from 90 to 110 days. Kharif or winter is the main rice growing season in the country. It is known as Winter Rice or Kharif Rice as per the harvesting time. The sowing time of winter (kharif) rice is June-July and it is harvested in November-December. About 84% of the country's rice crop is grown in this season and generally, medium to long duration varieties are grown. Summer rice is called as Rabi rice. The sowing time of summer rice is November to February and harvesting time is March to June. The area under summer rice is only 9% and early maturing varieties are mostly grown in this season.

Rice is grown under varying Eco-systems on a variety of soils under varying climatic and hydrological conditions ranging from waterlogged and poorly drained to well drained situations. It is also grown under rain fed as well as irrigated conditions. The total area under irrigated rice is about 22.00 million hectares, which accounts about 49.5 per cent of the total area under rice crop in the country. The rainfed eco-system includes upland and low land eco-systems. Upland rice areas lies in eastern zone comprising of Assam, Bihar, Eastern M.P., Orissa, Eastern U.P., West Bengal and North-Eastern Hill region. In the rainfed upland rice, there is no standing water in the field after few hours of cessation of rains. The total areas under upland rain fed rice in the country is about 6.00 million ha., which accounts 13.5 per cent of the total area under rice crop in the country. The productivity of upland rice is very poor (0.90 tonnes per ha). Low land rice area is about 14.4 million ha., and accounts to 32.4 per cent of the total area under rice crop in the country and the average productivity of rice in these areas ranges from 1.0 to 1.2 tonnes per ha.

Based on climatic conditions, India is broadly divided into five major rice growing regions viz. north-eastern, eastern, northern, western and southern regions. The eastern region comprises of Assam and North eastern states and rice is grown in this region in the basin of Brahmaputra river. This region receives very heavy rainfall and rice is grown under rain fed condition. The eastern region comprises areas where rice is grown in the basins of Ganga and Mahanadi rivers and has the highest intensity of rice cultivation in the country. Similar to north-eastern region, it receives heavy rainfall and rice is grown mainly under rain fed conditions. Northern region comprises of Haryana, Punjab, Western Uttar Pradesh, Uttranchal, Himachal Pradesh and Jammu & Kashmir and experiences low winter temperature and only single crop of rice from May-July to September-December is grown in this region. In western region, which comprises of Gujarat, Maharashtra and Rajasthan, rice is largely grown under rain fed condition during June-August to October - December. Southern region comprises of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu, where rice is mainly grown in deltaic tracts of Godavari, Krishna and Cauvery rivers and the non-deltaic rain fed area of Tamil Nadu and Andhra Pradesh under irrigated condition in deltaic tracts.

The problems/constraints in rice production vary from state to state and area to area. The major rice growing areas are concentrated in Eastern region and this region is generally experiences high rainfall and severe flood almost every year. The loss to the rice crop is considerably very high. Besides, in upland areas the crop gets setback either from high rainfall or drought condition. Often rice crop suffers with soil moisture stress due to erratic and inadequate rainfall. In upland soils rain water flows down quickly and farmers are not able to conserve the soil moisture. There is also no facility for life saving irrigation particularly in upland and drought prone rainfed lowland areas. Intermittent soil moisture stress, due to low and erratic rainfall and poor soil problems are in Madhya Pradesh, Orissa and some parts of Uttar Pradesh. The problems of flash floods, water logging/ submergence due to poor drainage, low-lying physiography and high rainfall in submergence prone lowlands are in Assam, West Bengal, North Bihar and Eastern Uttar Pradesh. In upland rainfed rice crop is grown under rainfed conditions, the growth is mostly dependent on the vagaries of the monsoon. In the years of scanty or adverse distribution of rainfall, the crop fails owing to drought and in the years of heavy rainfall, particularly during blossoming, there is poor grain setting and also the matured grains germinate on the panicles.

The scope for expansion of area under rice cultivation has almost been exhausted, the only way to sustain production for meeting the increasing population demand, is to increase the productivity per unit of area including intensive use of land by increasing the cropping intensity. Emphasis may be given on a cropping system approach rather than a single crop development approach. Replacement of low potential/pest susceptible old varieties by new high yielding varieties with promising yield potential may be significant to increase the productivity. Also encouraging cultivation of hybrid rice through demonstrations and making seed available to the farmers will be important to sustain rice production in the country.