EFFECT OF CROP ESTABLISHMENT AND WEED CONTROL PRACTICES ON THE PRODUCTIVITY, PROFIT ABILITY AND NITROGEN UPTAKE IN BASMATI RICE

Rice (*Oryza sativa*) is a principal and extensively grown food crop of India. It occupies the highest acreage (42.8 m ha) of total cultivable land and contributes about 44.5 per cent with a production of 81.8m tonnes to the total food grain production (191.5m tonnes) during 1994-95 in India. The leading aromatic fine quality rice in the world trade, popularly known as Basmati, is traditionally grown in the north western part of Indian sub continent (DRR, 1992). Of the 13.5 million tonnes of rice that entered the world trade in the year 1993, less than 10% was of the basmati quality. Yet, basmati of the sub-continent commanded the highest premium and was priced about three times that of high quality non-basmati types. From an area of about 8 lakhs hectares under basmati cultivation in Punjab, Haiyana and Western Uttar Pradesh nearly 6.5 lakh tonnes of milled rice was produced annually. About 60 percent of it was exported. Countries in the west Asia, Europe - and the United states were the major importers of Basmati rice, which now accounted for 63.6 per cent of the foreign exchange earned from different agricultural products. Earning through basmati alone touched Rs. 1400 crores in the year 1993-94 (Siddiq, 1994). The average yields 1744 kg ha^{-1} (2620 kg ha^{-1} rough rice) (INDIA, 1993) of rice in the country is very low as compared to the world average (3500 kg ha^{-1}) (IRRI Facts 1993). There is more scope to increase the average yields of rice provided improved package of practices are adopted. Countrol of weeds is one of the most important and necessary practice in the management of rice crop.

Crops and weeds complete for the same nutrients, water, light and space. Weeds by virtue of their wider adoptability and faster growth dominate the crops habitat and reduce the yield potential (Raju and Reddy, 1986). Hence weeds may easily nullify various improvements introduced by man in crop production. Although the modern rice varieties and the relevant technology developed are attractive, there are several problems in making rice husbandry a profitable enterprise. Many times, the adoption of both the capital and labour intensive practices covering nutrients and pesticides, have made returns in rice culture either marginal or doubtful. This necessitated the development of low cost production technology.

Conventional methods of land preparation are wasteful of several resources which are needed for rice production and short in supply, In view of the greater demand for Rice based (especially Rice-wheat) cropping system it is necessary to replace the traditional tillage practices, so that the subsequent is not badly affected by the Soil Physiochemical properties. More over puddling which is prerequisite for rice transplanting makes land preparation difficult for the succeeding dry crops resulting in cloddy soil Structure, loss of soil moisture, delayed planting in adequate seed-soil contact which results in low plant stand and yield on the other hand the age old practice of excessive tillage not only involves high energy. Consumption but results in development of hard pan in the soil and deteriorates soil structure which adversely effect crop growth and yield besides, the process of transplanting of rice seedlings being purely dependent on manual labour, the farmer generally faces the problem of labour shortage and at times, the planting is delayed beyond the

optimum season, as a result of which the yield of the crop is affected considerably. Hence it is desirable to explore possibilities to dispense with transplanting, which consumes 30-40 % of the investment in rice culture. Also for the very early or early rice varieties, the desired panicle number is easily maintained under direct-sown crop, while the number is around half of the desired number under transplanted crop, at the same level of management. Large scale trials and extension programmes in Asia have showing that minimum tillage techniques can replace conventional methods in rice using simple, inexpensive equipment, without reduction in yields and with considerable savings in time, water, man, animal and machine power (Elias, 1969)). No-till and minimum till systems can produce rice grain yields, similar to those produced with conventional puddling (Seth et al., 1971 and Dc Datta et al., 1979) Minimum tillage can reduce the land preparation period for rice from 15-30 days to 6-10 days (Brown and Quantrill, 1973). In some cases, however, puddling was found to be essential for higher rice yields (Curfs and Moomaw, 1973 and Singh et al., 1977). These contradictions arise because of variations in weed, crop management and Soil Physical Properties.

Hand weeding proved to be the most effective method in controlling weeds as compared to chemical and mechanical methods (Noda, 1977). Behera et al (1997) on the basis of the experiments conducted at Palsipani. Ratanpur and Raturapur reported that (Finger weeding twice at 10-14 and 25 days after Germination (DAG) and 1 Finger weeding at 10-14 DAG + 1 hand weeding at 25 DAG being at par significantly influenced the

paincls/m^2, panicle weight, Grains/panicles grain yield of early rice. Though hand weeding is very effective but it is labour intensive time consuming and also expensive. Moreover, it is possible only when the weeds have attained certain height for obtaining a proper grip and by that time, the weeds would have already done considerable damage to the cop. Continuous rains in rainy season make manual weeding more difficult. in such situations, herbicides can take care of weeds right from the beginning of crop growth and increase rice yields. In India, use of butachior as pre-emergence herbicide is recommended for weed control in transplanted rice (Bhan et al. 1985; Singh, et al., (1986). Moorthy and Manna, (1982) reported that pretilachlor 0.50 kg/ha was equally effective to that of weed free control and they recommended use of butachlor 1.50 Kg/ha. Castin and Moody, (1989). obtained the height, grain yield and best weed control with pretilachlor 0.75 kg/ha Compared with butachlor .1.0 kg/ha. Angiras and Rana (1998), reported that pertilachlor (0.80 kg/ha) increased all the yield attributes (Effective panicles/ m2, Spikelets/panicle, 1000 grain weight the effective control of weeds and higher yield attributes with pretilachlor (0.80 kg/ha) pre emergence. increased the grain yield significantly. Singh and Singh, 1998, reported that thiobencarb in combination with 2, 4-D was most effective in enhancing the grain yield of rice. The combination was most effective in minimizing weed dry matter. Herbicides alone could not control weeds effectively. However, some workers reported that herbicides were effective only when their application was followed by single hand weeding (Subbian, 1983). Keeping in view the facts mentioned above it is proposed to conduct an experiment entitled, "Effect of crop establishment and

weed control practices on the productivity, profitalrility and Nitrogen uptake in Basmati rice to achieve the following objectives.

1. To develop crop establishment and weed control practices for basmati rice for reducing energy requirement -

2. To study the effect of crop establishment and weed management practices on growth and yield of Basmati rice.

3. To study the effect of crop establishment and weed management practices on nutrient uptake by crop and weeds.

4. Economics of different treatments.

TECHNICAL PROGRAMME

Treatments

Factors	Levels / Specification	Notation
Variety	Pusa Basmati-1	

Main plot Treatments

1.	Transplanting - Puddled	T_1
2.	Transplanting - Unpuddled	T_2
3.	Direct Seeding - Unpuddled Line Sowing	T_3

Sub Plot Treatments

1.	Chemical weed Control	W_1
2.	Stale Seed bed	W_2
3.	Stale Seed bed followed by chemical weed control	W_3
4.	Stale Seed bed followed by hand weeding	W_4
5.	Chemical weed control followed by hand weeding	W_5
6.	Weed free check	W_6
7.	Unweeded check	W_7

No. of replication		4
Design	Split plot design	
Treatment Combination	-	21
Total No of Plots		21x4 = 84

Observations-

The following observations will be recorded during the period of investigation.

Soil Parameter - 1. pH

2. Organic Carbon
3. Available N, P and K

Plant parameter:-

Growth Studies:- Following observations will be made 40 days after transplanting at panicle emergence, flowering and maturity stage.

1. Plant height
2. Number of shoots per m^2
3. Dry matter accumulation

Development studies-

1. Number of days taken to panicle emergence
2. Number of days taken to 50% flowering
3. Number of days taken to maturity

Harvest studies-

1. Number of panicles/m^2
2. Panicle length
3. Total number of grains/panicle
4. Grain weight per panicle
5. 1000- grain weight

Yield studies-

1. Grain Yield
2. Straw yield
3. Harvest Index

Uptake Studies-

1. N- Uptake in grain
2. N- Uptake in straw

Weed Studies-

1. Species wise weed population
2. Dry Weight of weed
3. N- Uptake by weeds

Root studies-

1. Weight of root
2. Volume of root
3. Length of root

Economic Analysis-

1. Cost of cultivation
2. Gross income
3. Net return

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