

Effect of Different Weed Management Practices on Growth and Yield of Direct Seeded Puddled Rice in North eastern zones of Tamil Nadu

Abstract

The field experiment was conducted at Post Graduate Research Institute in Animal sciences Kattupakkam Tamil Nadu, India during *Rabi* (Oct-Mar) seasons of 2016-17 to study the effect of different weed management techniques in direct seeded puddled rice variety ADT 43. The experiment was laid out with unpaired t test design. The treatment of chemical weed management technique (pre - emergence application of pretilachlor) was compared with two time manual weed management technique (control) in direct seeded puddled rice. Among the weed management techniques, chemical weed management technique significantly influenced the growth and yield characters and yield of direct seeded puddled rice. The maximum plant height, number of tillers /hill , grain yield, straw yield and cost benefit ratio were recorded under chemical weed management technique during *Rabi*. The lowest grain yield, straw yield were recorded under control treatment.

Keywords: Weed management, Pretilachlor, Direct seeded rice, Yield, Economics

Introduction

“More than half of the world’s population depends rice as one of the important staple food. India has the largest area (44 million hectares) and it is the second largest producer (131 million tonnes) of rice among the rice growing countries. Paddy (*Oryza sativa* L.), a prime crop across the globe for food security” [1]. “Rice is the prime cereal that is cultivated in an area of 43.1 million hectares with an annual production of 112.9 million tonnes and productivity of 2.6 tonnes/ha in India” [2]. “Tamil Nadu alone contributes eight per cent of the national rice production from an area of 2.07 million hectares, with a production of 7.15 million tonnes” [3]. “Among the states with considerable area under rice cultivation, Punjab has the highest rice productivity (4010 kg/ha) in the country followed by Tamil Nadu (3070 kg/ha)” [4] . “At the current population growth rate (1.5 %), the rice requirement of India by the year 2025 would be around 125 million tonnes” [5]. “To meet the food requirement of the growing population, the rice production has to be enhanced with good management practices with shrinking availability

of land and water resources condition” [6]. “Labour required for nursery raising, uprooting and transplanting of seedlings are saved to the extent of about 40% and also saving of water (up to 60%) as nursery raising, puddling, seepage and percolation are eliminated in direct seeded rice” [7]

Weed management is one of the important cultural practices which will help to improve the yield considerably especially in direct seeded puddle rice [8] “A weed-free period for the first 25-45 DAS is required to avoid any loss in yield in direct-seeded rice” [9], [10]. “Pretilachlor is selective herbicide absorbed by hypocotyls and coleoptiles and roots of germinating weeds. It is applied as preemergence for controlling annual grasses, broadleaved and sedges” [[7]. “It controls *Echinochloa crusgalli*, *Echinochloa colona*, *Cyperus iria*, *Cyperus difformis*, *Eclipta alba*, *Ludwigia parviflora/octavalvis*, *Monochoria vaginalis*, *Panicum repens* in rice” [11] . Hence this study was carried out to find the effective weed management technique in direct seeded puddled rice.

Materials and Methods

The field experiment was carried out during *rabi* (Oct-Mar) of 2016-17 at PGRIAS, Kattupakkam Kancheepuram district, Tamil Nadu, India to evaluate the performance of different weed management techniques in direct seeded puddled rice. the latitude and longitude of the experimental plot is 12° 41' and the Longitude is 79° 58. Maximum and minimum temperature of the study period recorded was 35.6°c , 25.7°c respectively. The rainfall received during period was 1050.3 mm The soil of the experimental field was clay loam. Two experiments such as chemical weed management technique (T₁) and two times manual weeding (T₂) (control) were compared. The experiments were replicated thrice. The new variety of ADT 43 was used for the crop season and followed the fertilizer dose of 50:25:25 kg N:P₂O₅:K₂O/ha. For drum seeding the pre germinated seeds were sown by using eight row paddy drum seeder in a puddled soil. In first treatment (T₁) pretilachlor herbicide (Sofit) was applied @0.4 kg a.i/ha to the crop in the wet soils on three days after sowing of the crop. In T₂ weed management was carried out at 20 days after sowing and second weeding at 40 Days after sowing .Observations on growth and yield characters were recorded during harvesting stage. The grain and straw yield were recorded. Statistical analysis was done using unpaired t test method.

Results and Discussion

Plant growth characters such as plant height, number of tillers and dry matter production is influenced by different weed management technique. Chemical weed management technique and manual weed management technique were compared in this study. Chemical weed management technique recorded significantly higher growth characters. The maximum plant height of (77.14cm), No. of tillers /hill (16), dry matter production (7274 kg/ha) were recorded under chemical weed management technique (Table.1). The earlier weeding in direct seeded puddle rice which might have controlled the weeds in early stage of the crop itself and leading to faster growth rate might be attributed to higher plant height [12].

Optimum plant population and geometry under chemical weed management technique could control the weeds effectively at early stage and enhance the availability of more resources to the plants that resulted in increased plant height and more number of tillers. Further 84 % tillers produced panicles in chemical weed management technique, compared to conventional practices [4] . Earlier weed control created enough spacing might have resulted in profuse tillering under chemical weed management technique, which might have facilitated plants for better utilization of the resources. There was yield advantage, less cost of expenditure in chemical weed management technique [11]. Lower grain yield in drum seeding might be due to severe weed problem especially in direct seeded rice. In direct seeded rice seedlings were so thin, manual weeding could not be performed before 20 days of sowing. Weed competition in early stage of crop growth reduced the yield up to 15-20 % . Hence early stage of weed growth and higher weed density were higher in second treatment (T_2) . This advantage of early stage of weed control by chemical weed management technique helps in reducing the weed growth leads to enhance of tiller numbers, has been reported earlier. [13]. The increase in the grain yield of chemical weed management technique was attributed to profuse and strong tillers with long panicles, with higher grain yield. The similar results were obtained by [13]. Higher straw yield was obtained in chemical weed management method might be due to early and timely control of weeds[14]. This in turn increased plant height further increased the straw yield of the crop. Cost benefit ratio was higher in chemical weed management compared to manual weeding method during the study period.

Table 1: Crop establishment techniques on growth characters of rice ADT 43

| S.No. | Parameters | Chemical weed management | Manual weed management |
|-------|-------------------------------|--------------------------|------------------------|
| 1. | Plant height (cm) | 77.14 ± 0.72 | 63.77 ± 0.705 |
| 2. | Number of tillers (/hill) | 16.18 ± 0.523 | 12.13± 0.432 |
| 3. | Dry matter production (kg/ha) | 7274 ±213.06 | 6142 ± 195.5 |
| 4. | Grain yield (kg/ha) | 5780 ± 183 | 4785 ± 168 |
| 5. | Straw yield (kg/ha) | 6734 ± 201 | 5219 ± 114 |
| 6. | Cost- Benefit Ratio | 2.08 | 1.85 |

Conclusion

From the above study it can be concluded that higher plant yield and growth parameters were obtained with chemical weed management technique compared to manual weed management technique in the new variety of ADT 43 in north eastern zone of Tamil Nadu

References:

1. Tolba, R.A., M.A. El-Shirbeny, S.M. Abou-Shleel, and M.A. El-Mohandes. Rice Acreage Delineation in the Nile Delta Based on Thermal Signature. *Earth Syst and Environ.* . 2020. 4 (1):287-296
2. India Stat, (2017-18). Socio economic statistical information about India. <http://www.indiastat.com/default.aspx>.
3. Ministry of Agriculture. (2010). Policy Note, Demand No.5- Agriculture, 2010-2011. Government of Tamil Nadu, India.
4. Reddy SR. *Agronomy of field crops*. Kalyani Publ. New Delhi-110002. 2012; pp. 3-6.
5. Kumar, R.M., Surekha, K., Padmavathi, C.H., Rao, L.V. S., Latha, P.C., Prasad, M.S., Babu, V.R., Ramprasad, A.S., Rupela,O.P., Goud, P.V., Raman, P.M., Somashekar, N.,Ravichandran, S., Singh S.P. and Viraktamath, B.C. Research

experiences on System of Rice Intensification and future directions. *J. Rice Res.* 2009, **2(2)**:61-73.

6. Karthika, R, Subramanian, E and Ragavan. Effect of Weed Management Practices on Crop Growth, Yield and Economics of Direct Seeded Rice Ecosystems Madras Agric. J., 2019; doi:10.29321/MAJ 2019.000244.2019; special issue :184-189.
7. Pathak H, Tewari AN, Sankhyan S, Dubey DS, Mina U, Singh VK, Jain N, Bhatia A. Direct-seeded rice: Potential, performance and problems – A review. *Current Adv. in Agril Sci.* 2011; 3(2): 77-88.
8. Thakur, A.K., Uphoff N and Antony. E. An assessment of physiological effects of System of Rice Intensification (SRI) practices compared with recommended rice cultivation practices in India. *Expl. Agric.* 2010.46(1):77–98.
9. Chauhan BS, Johnson DE. Row spacing and weed control timing affects yield of aerobic rice. *Field Crops Res.* 2011; 121:226-231.
10. Singh M, Sriram CV, Hanji MB, Prabhukumar S, Kishor N. Crop-weed competition and weed management studies in direct-seeded rice (*Oryza sativa*). *Indian J. of Agronomy* 2012; 57(1): 38-42.
11. Das TK. 2013. Weed science basics and applications. Jain Brothers, New Delhi-110005, 2013, 338.
12. Kaur S, Singh S. Bio-efficacy of different herbicides for weed control in direct-seeded rice. *Indian J. of Weed Sci.* 2015; 47(2):106-109.
13. Kundu CK, Biswas U, Kundu A, Bera PS and Sathish, G. Studies on Bio efficacy and Phytotoxicity of Pretilachlor 30.7% EC in Direct Seeded Rice. *International Journal of Chemical Studies.* 2017.5(5): 1847-1850
14. IRRI. (2011). Trends in the rice economy. *In*:[http:// beta.irri.org/ solutions/ index.php](http://beta.irri.org/solutions/index.php).

