Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(2): 1480-1482
Received: 22-01-2020
Accepted: 24-02-2020

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Review on response to crop stand establishment and nutrient management in rice based cropping system in north coastal Andhra Pradesh

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Abstract
Rice (*Oryza sativa* L.) is an important cereal crop of India and it is the staple food for most of the Indians and occupies a significant position in the agricultural economy of the country. This crop is grown by adopting different establishment techniques. However, the traditional transplanting method done usually by hired labour encounters predicament due to vagaries in the monsoon, untimely available of canal water, escalating labour wages, time consuming, with more water required for land preparation, as well as crop establishment and finally inadequate plant population as a result of delayed planting. Late planting of rice affects growth and yield of not only rice but also succeeding crops, thus reducing the system productivity and profitability. The productivity of the soils largely depends upon the physio-chemical properties and also the management practices adopted by the farmers. Integrated nutrient supply concept involving both organic and inorganic sources has been known to mutually reinforce the efficacy of both these resources resulting in higher productivity besides maintenance of soil fertility (Prasad and Reddy, 1998). Cropping systems being dynamic result in judicious use of production resources, since nutrient management in cropping system is more complex than individual crops. Inadequate and imbalanced fertilizers in cropping system not only result in low yields but also deteriorate soil properties. In North Coastal Zone of Andhra Pradesh 45,000 ha of rice is grown under rainfed upland conditions (Ramana *et al.*, 2007) and the crop response to applied fertilizers is inconsistent due to scarce moisture availability.

Keywords: Rice, crop stand establishment, nutrient management

Introduction
Rice (*Oryza sativa* L.) is an important cereal crop of India and it is the staple food for most of the Indians and occupies a significant position in the agricultural economy of the country. In India, it is cultivated in an area of 43.86 M ha with a production of 105.80 million tonnes and productivity of 2.7 t ha^{-1}. In Andhra Pradesh, it is grown in an area of 38.09 L ha with a production of 11.56 M t and productivity of 2.9 t ha^{-1} (Anonymous, 2015) [1]. However, the productivity of rice in India is very low as compared to other rice growing countries like Australia (10.1 t ha^{-1}), USA (7.5 t ha^{-1}), Russia (5.2 t ha^{-1}) and China (4.3 t ha^{-1}). Rice being a valuable and important food crop it is necessary to reduce the use of chemical fertilizers by following management strategies like combined use of organic and inorganic sources of nutrients. Hence, proper blending of chemical fertilizers with organic manures not only improves soil health but also helps to maximize the sustainable production. The philosophy in INM system is to maintain soil fertility, sustaining agricultural productivity and improving farmer's profitability through judicious and efficient use of mineral fertilizers to the extent possible. This INM system aims at sustainable crop production levels with minimum deleterious effect of chemical fertilizers on soil health and least disturbance to the rice ecosystems.

The declining trend in the productivity of rice crop has become the major concern for the farmers, which is mainly due to decline in soil health. The loss of nutrients from the soil in mainly due to exhaustive cropping systems like rice-maize or rice-oilseeds.

Traditionally in North coastal Zone, Rice- Rice fallow Blackgram under zero tillage is the cropping sequence followed by most of the farmers especially in uplands with the residual moisture and also in rice fallows where there is no water source for irrigation during *rabi*. Rice - Rice fallow Blackgram system yields over a period of time got reduced due to terminal drought, yellow mosaic virus, sucking pests etc. Consequently, farmers are in search of an alternate crop that can successfully establish with little moisture and minimum farm operations that could result in better benefit cost ratio.

Response of Rice to different Crop stand establishment and nutrient management in rice based cropping system in North Coastal Andhra Pradesh in India and Abroad:

1. Growth Parameters of rice as influenced by Crop stand establishment and nutrient management

The results of the experiments conducted in India and other parts of the world have indicated that growth parameters is significantly increased with combination of Crop stand establishment and nutrient management.

Goel and Verma 2000 [4] reported the higher plant height in transplanted paddy compared to direct sowing in an experiment conducted at Karnal. Sharma *et al*. (2005) [19] in their experiment did not observe significant difference in plant height between puddled and unpuddled methods of rice crop establishment. In a field trial conducted by Gill *et al*., (2006) [5] at Ludhiana observed direct seeded rice produced significantly more drymatter than transplanted rice. Ram *et al*. (2006) [16] in a field trial conducted on clay loam soils of Rice Research Station, Kaul, Haryana reported maximum plant height in transplanting which was significantly superior over direct seeding by seed drill, drum seeding and direct seeding by zero - till drill. Rice plants produced more number of productive tillers hill^{-1} (23) in transplanted rice according to Manzoor *et al*. (2006) [8]. According to Murthy *et al.* (2007) [9], in an experiment conducted in rice puddle seeding @ 200 seeds m^{-2} recorded significantly higher number of tillers m^{-2} (536) followed by puddle seeding @ 200 seeds m^{-2} in 25 cm lines. Transplanting with 25 days old seedlings recorded lowest number of tillers m^{-2} (205). Gangwar *et al*. (2008) [6] reported the higher dry matter accumulation in drum seeded rice over manual and mechanical transplanting. Mankotia *et al*. (2009) [10] reported that broadcasting of pre sprouted seeds and transplanting methods produced significantly taller plants compared to that of zero- tilled rice. Barla and Kumar (2011) [2] conducted field experiment on different rice establishment methods at Zonal Research Station, Darisai, Jarkhand and revealed that the plants in modified SRI method were taller by 4.1 cm and 12.9 cm than conventional (105.6 cm) and drum seeding (96.7 cm) methods. Parameswari *et al*. (2014) [11, 13] reported more plant height (83.2 cm) in the direct sown rice than transplanted rice.

2. Yield of rice as influenced by as influenced by Crop stand establishment and nutrient management:

According to Larry *et al*. (2012) [4] transplanting method recorded the highest grain and straw yields of paddy compared to other methods. Sowmyalatha *et al.* (2013) reported significantly highest grain yield (7717 kg ha^{-1}) under SRI method of planting on red sandy loam soils of Karnataka. Pasha *et al*. (2014) stated that machine transplanting recorded maximum panicle length (23.6 cm), grains per panicle (156) and grain yield (6751 kg ha^{-1}) and it was significantly superior over broadcasting Experimental results of Parameswari and Srinivas (2014) [11, 13] revealed that, transplanting method recorded significantly highest grain yield (4408 and 4593 kg ha^{-1}) and was on par with SRI (4266 and 4438 kg ha^{-1}) which were significantly superior over direct seeded rice (3894 and 4075 kg ha^{-1}) under puddle condition during two years of research, respectively.

3. Economics of rice as influenced by Crop stand establishment and nutrient management:

Ramesh and Vaypuri (2008) revealed that benefit cost ratio of rice was increased with application of 100% recommended dose of fertilizers along with green manure @ 6.25 t ha^{-1} as compared to application of 100 per cent RDF and also control on clay soils of Annamalai University, Tamil Nadu. Yadav *et al.*, (2009) [21] reported that, insitu incorporation of wheat/rice straw + GM + PM @ 5 t ha-1 resulted in maximum net income (57.65 x 103 ha^{-1}) and B: C ratio (1.60) as compared to other treatments. Davari and Sharma (2010) conducted an experiment on basmati rice consecutively for two years at IARI, New Delhi and reported that maximum net returns ha^{-1} (Rs. 52,400, 74,900) and B:C ratio (1.64, 2.23) were recorded with the application of vermicompost + wheat residue + biofertilizer. Sowmyaalatha *et al.*, (2012) [20] reported that SRI method of planting recorded the highest amount of net income and B:C ratio (Rs. 50,886/ha and 1.62 respectively) with application of 150% RDF compared to conventional method of cultivation.

4. Nutrient uptake of rice as influenced by Crop stand establishment and nutrient management:

Sharma *et al.*, (2015) [18] reported that in vertisols of Jabalpur, highest uptake of nitrogen, phosphorus and potassium was recorded with the treatment 75% NPK through inorganic fertilizers + 5 t FYM ha^{-1} + BGA + PSB + Zn. The experimental results of Sowmyalatha *et al.*, (2013) revealed that, SRI method of planting recorded significantly higher NPK uptake by grain (77.42, 21.77 and 61.46 kg ha^{-1} respectively) on red sandy loam soils of Karnataka. The uptake of N, P and K by rice increased with the application of 25 per cent N, P and K through green manure + 75 per cent through inorganic fertilizer on sandy loam soils of Bihar (Yadav and Saha. 2014) [22].

References

1. Anonymous. Report on area, production and productivity of rice. Ministry of Agriculture, Govt of India, 2015.
2. Barla S, Kumar SS. Evaluation of rice establishment techniques in Jharkhand platue. *Oryza*. 2011; 48(1):79-80.
3. Davari MR, Sharma SN. Effect of different combinations of organic materials and biofertilizers on productivity, grain quality and economics in organic farming of basmati rice (*Oryza sativa* L.). Indian Journal of Agronomy. 2010; 55(4):290-294
4. Goel AC, Verma KS. Comparative study of direct seeding and transplanting of rice. Indian Journal of Agricultural Research. 2000; 34(3):194-196.
5. Gill MS, Kumar, Kumar P. Growth and yield of rice (*Oryza sativa* L.) cultivars under various methods and times of sowing. Indian Journal of Agronomy. 2006; 51(2):123-127.
6. Gangwar KS, Gill MS, Tomar OK, Pandey DK. Effect of crop establishment methods on growth, productivity and soil fertility of rice (*Oryza sativa* L.) – based cropping systems. Indian Journal of Agronomy. 2008; 53(2):102-106.
7. Laary JK, Dogbe W, Boamah PO, Agawini J. Evaluation of planting methods for rowth and yield of "DIGANG" rice (*Oryza sativa* L.) under upland condition of Bawku, upper east region, ghana. ARPN Journal of Agricultural and bilogical science. 2012; 7(10):814-819.
8. Manzoor Z, Awan TH, Zahid MA, Faiz FA. Response of rice crop (Super basmati) to different nitrogen levels. Journal of Animal and plant sciences. 2006; 16(1, 2):52-55.
9. Murthy KMD, Goud ERK, Rao AU. Effect of different crop establishment methods on growth and yield of rice

in Northern Telangana Zone of Andhra Pradesh. Crop Research. 2007; 34(1-3):24-26.
10. Mankotia BS, Sekhar J, Negi SC. Effect of crop establishment techniques on productivity of rice-wheat cropping system. *Oryza*. 2009; 46(3):205-208.
11. Parameswari YS, Srinivas A, Ram Prakash T, Narendar, G. Effect of Different establishment methods on rice (*Oryza sativa* L.) growth and yield- a review. Agri. Reviews. 2014; 35(1):74-77.
12. Pasha L, Reddy MD, Reddy MG, Uma Devi M. Effect of irrigation schedule, weed managementand nitrogen levelson weed growth in rice (*Oryza sativa*) under aerobic conditions. Indian journal of weed science. 2011; 43:54-60.
13. Parameswari YS, Srinivas A. Influence of weed management practices on nutrient uptake and productivity of rice under different methods of crop establishment. Journal of rice research. 2014; 7(1, 2):77-84.
14. Prasad PVN, Srinivasulu reddy D**.** Productive performance of rice based cropping system to nitrogen management**.** The Andhra Agricultural Journal**.** 1998; 50:141**-**143**.**
15. Ramana AV, Reddy DS, Ramkumar Reddy K. Influence of sowing time and Nitrogen levels on growth, yield and N uptake of rainfed upland rice. The Andhra Agricultural Journal. 2007; 50:75-81**.**
16. Ram M, Hari OM, Dhiman SD, Nandal DP. Productivity and economics of rice (*Oryza sativa*) - wheat (*Triticum aestivum* L.) cropping system as affected by establishment methods and tillage practices. Indian Journal of Agronomy. 2006; 51(2):77-80.
17. Ramesh S, Vayapuri V. Yield potential and economic efficiency of rice as influenced by organic nutrition under Cauvery delta region of Tamil Nadu. Plant Archives. 2008; 8(2):621-622.
18. Sharma GD, Thakur RK, Chouhan N, Sharma BL, Tiwari DK. Effect of INM on yield, nutrient uptake, protein content & economic performance of rice (*Oryza sativa* L.) and soil fertility in a vertisol. Green Farming. 2015; 6(1):50-54.
19. Sharma SK, Pandey DK, Gangwar KS, Tomar OK. Effect of crop establishment methods on performance of rice (*Oryza sativa* L.) cultivars and their effect of succeeding wheat (*Triticum aestivum*). Indian Journal of Agronomy. 2005; 50(4):253-255.
20. Sowmyalatha BS, Ramachandra C, Shivakumar M, Thimmegowda MN, Suresh Naik KP. Influence of methods of cultivation and fertility levels on productivity and profitability of rice hybrids. 2012; 44(1, 2):11-13.
21. Yadav DS, Vineet Kumar, Vivek Yadav. Effect of organic farming on productivity, soil health and economics of rice (*Oryza sativa* L.) - wheat (*Triticum aestivum* L.) system. Indian Journal of Agronomy. 2009; 54(3):267-271.
22. Yadav SK, Saha B. Partial substitution of nitrogenous fertilizer through organics enhances yield, nutrients uptake and physiological characters of transplanted rice (*Oryza sativa* L.). Soil Environment. 2014; 33(2):96-102.