

EFFECT OF BIOSIL-DE APPLICATION AT DIFFERENT LEVEL AND TIME ON RICE (*ORIZA SATIVA*) UNDER RAINFED CONDITION OF KYMORE PLATAEU AND SATPURA HILLS OF M.P.

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Abstract: Rice (*Oryza sativa* L.) is the most important cereal food crop in the world providing major source of food energy for more than half-human population. About 80% of the rice is produced and consumed in Asia, where rice is the integral part of culture and tradition. In India, it is cultivated in 101.7 m ha with production of 117.3 MT and productivity of 1143 kg/ ha (Economic survey of India 2012-13). In Madhya Pradesh, it is cultivated on 1.76 m ha with annual production of 3.02 MT and productivity of 1807 kg/ha (MP, Krishi net, 2012 -13). Low and declining crop response to applied nutrients through chemical fertilizer are the result of continuous nutrient mining, because of indiscriminate use of fertilizers, leading to an imbalance of soil nutrients by 2020. Thus, there is an urgent need to increase the rice production under the deteriorating resource base such as land, labour, water and other inputs. Direct seeded rice cultivation is popular and best alternative of transplanted rice in India. It is practiced nearly in one third of total rice area of the country as transplanting is a labour intensive and costly practice. The natural sources of nutrients such as FYM, vermicompost, green manures and such other organics provide to be a cheapest source of macro as well as micro plant nutrients. They also provide an opportunity to proliferate microbes, hence, create a favorable environment to soil and plants resulted in enhanced the productivity of soil water and crop. In nutrient recycling from such organic sources, the soil microorganisms play an important role within the soil ecosystem. The organic sources of nutrients Viz. FYM, vermicompost, Neem cake, crop residue, poultry manure, spent wash, fly ash etc. are mostly drawn from local resources and developed locally which are easy to handle and proved cheaper to others.

Keywords: Application, Biosil-de, Rice, Yield attributes

INTRODUCTION

Other chemical amendments like pyrite, iron sulphate, aluminum sulphate and sulphuric acid have been used for reclaiming the sodic soils and recommended for amelioration of some calcareous clay soil (Sharma et al. 1989) as their effectiveness for improving soil conditions and crop yield are comparable to that of gypsum. Presently, biosil containing SiO₂ 40 - 45% is brought in the practice as soil conditioner which needs to be assessed and compared with organics curtailing the use of chemical fertilizers which may not only reduce the cost of cultivation but also improve the soil status and help to protect the environment. Fly Ash based soil conditioner not only improves the crop productivity and soil fertility but also mobilizes macro and micronutrients in the soil. Keeping this in view, the present investigation entitled study on “Effect of Biosil-de Application at Different Level and Time on Rice (*Oriza sativa*) under Rainfed Condition of Kymore Plateau and Satpura Hills of M.P.”

MATERIALS AND METHODS

The present investigation entitled “Effect of Biosil-de Application at Different Level and Time on Rice (*Oriza sativa*) under Rainfed Condition of Kymore Plateau and Satpura Hills of M.P.” was conducted during the kharif seasons 2014 at Department of Agronomy, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.), replicated three times in factorial randomized block design. The soil was Vertisols clayey loam with organic carbon content 0.54 percent and available N, P₂O₅ and K₂O 266, 12.45 and 293 kg per ha, respectively. Soil was neutral in reaction (pH 7.10). The nine-treatment combination comprised of three biosil-de doses viz., 250, 375, 500 kg per ha and three time of application viz., at the time of vegetative growth stage, at the time of bloom stage and at the time of grain development stage. The total rainfall received during the crop season was 889 mm in 2014 respectively.

Table 1. Effect of different dose of biosil - de and time of application on growth parameters, yield attributes and grain and straw yield of rice

Treatment	Plant population m ²	Plant height (cm)	Number of tillers per m ²	Dry weight per plant (g)	leaf area index (LAI)	Effective tillers per m ²	Grains/ Panicle	Test weight (g)	Panicle length (cm)	Seed yield (q/ha)	Seed yield (q/ha)
Biosil-de dose kg/ ha											
250	118.62	65.96	251.99	12.10	4.15	229.77	144.44	19.86	22.36	39.59	80.48

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375	119.09	67.09	257.05	12.53	4.91	236.88	152.11	20.43	23.06	42.06	86.92
500	119.36	67.09	261.2	12.74	5.09	241.38	154.89	21.23	23.82	43.58	90.37
SEm±	2.33	0.51	2.06	0.34	0.11	2.25	1.24	0.24	0.31	1.02	1.92
CD at 5 %	NS	NS	6.17	1.03	0.33	6.74	3.72	0.71	0.93	3.08	5.77
Time of application											
At the time of vegetative growth stage	116.85	66.87	259.04	12.67	5.17	233.94	146.56	20.55	23.68	41.09	86.68
At the time of bloom stage	121.70	69.51	279.48	13.02	5.40	255.67	162.89	21.28	24.41	45.74	92.49
At the time of grain development stage	118.52	66.87	231.55	11.68	4.10	218.42	142	19.69	21.61	38.40	78.59
SEm±	2.33	0.51	2.06	0.34	0.11	2.25	1.24	0.24	0.31	1.02	1.92
CD at 5 %	NS	1.55	6.17	1.03	0.33	6.47	3.72	0.71	0.93	3.08	5.77

RESULTS AND DISCUSSION

Growth parameters

Plant population per m² at 15 DAS as affected by different treatments reveal that plant population was almost similar under all treatments the variation was no significant between them and the highest plant height was recorded 90 DAS under all treatments, however little reduction in plant height was also observed at maturity over proceeding stage plant height was not increased significantly due to different doses of biosil-de at successive growth stages including maturity, however biosil-de proved significantly superior with regard to time of application when biosil-de applied at the time of full bloom showed maximum plant height at 90 DAS (69.51cm) which is better than T₁ (at the time of vegetative growth) overall, it showed its superiority over other treatments for plant height these result are closely infirmity with the finding of Singh *et al.* (2008) and Dwivedi *et al.* (2007). The number of tillers per m² orderly increased with the advancement in growth intervals up to 90 DAS under all the treatments significant variations in the number of tillers per m² due to different doses of biosil-de was observed at 90 DAS. The application of biosil-de @ 500 kg/ha registered appreciably more number of tillers per m² at 90 DAS followed by biosil-de @ 375 kg/ha as compared to biosil-de 250 kg/ha and the biosil-de proved significantly superior with regard to time of application when biosil-de applied at the time of full bloom showed maximum number of tillers at 90 DAS of crop as compared to T₁ (at the time of vegetative growth) and T₃ (at the time of grain development stage). The average dry matter accumulation/hill gradually increased with the advancement in the growth stages upto maturity under all treatments at 90 DAS the dry weight per plant among different doses of biosil-de indicated that the D3 dose (biosil-de @ 500kg/ha) was found to be superior (12.74 g) over the remaining treatments for dry weights. The biosil-de proved significantly

superior with regard to time of application when biosil-de applied at the time of full bloom showed maximum dry weight at 90 DAS as compared to T₁ (at the time of vegetative growth) and T₃ (at the time of grain development stage) overall it showed its superiority over other treatments for dry weight. These results were in close conformity with the findings of Sarangi *et al.* (2001). The Leaf Area Index (LAI) increased progressively with the advancement of crop growth till 90 DAS under all the treatments. LAI was increased significantly due to different level of biosil-de and time of application at successive growth stages however, biosil-de proved significantly superior with regard to time of application when biosil-de applied at the time of full bloom. LAI values were maximum under the application of biosil-de at the time of full bloom 5.40 at 90 DAS as compared to applied at the time of vegetative growth and grain development.

Yield attributes and yield

Number of effective tillers per m² at 90 DAS increase with every level of biosil-de from 250 kg/ha to 500kg/ha. The effective tillers per m² were maximum (255.67) with the application of biosil-de @ 500 kg/ha applied at the time of full bloom and minimum (218.42) under biosil-de @ 250kg/ha at the time of grain development. The grains per panicle was influenced significantly due to different treatments. Increase in the dose of biosil-de applied at the time of full bloom enhanced the grains per panicle and the increase was marked over biosil-de @ 250, 375 and 500kg/ha. The grains were maximum (162.89) under the application of biosil-de @ 500 kg/ha applied at the time of full bloom and minimum (142.00) under biosil-de @ 250kg/ha at the time of grain development. The test weight increases with increasing doses of biosil-de with at the time of full bloom. However, it was makeable that the higher doses of biosil-de i.e. 500 kg/ha proved significantly superior over rest of the treatment and found at par to each other with respect to test weight. The panicle length was influenced significantly due to different

doses of biosil-de and time of application. The panicle length was remarkably higher (23.82cm) under dose of biosil-de @ 500kg/ha with at the time of full bloom stage (24.41cm) over rest of the treatments. The panicle length was minimum (22.36cm) in case of biosil-de @ 250kg/ha at the time of grain development (21.61cm). Grain yield was significantly influenced due to different treatments. Grain yield correspondingly increase with increased level of biosil-de 250 kg/ha to 500 kg/ha. The highest dose of biosil-de registered maximum grain yield (45.74 q per ha) when applied at the time of full bloom which was significantly superior over lower doses applied at the time of vegetative growth and grain development. The grain yield was minimum (38.40 q per ha) under application of different level of biosil-de at the time of grain development. These result are in close conformity with the finding of Buddhe et al. (2014) and Lee yong Bok (2003) and the straw yield was significantly higher (92.49 q per ha) under application of biosil-de @ 500 kg/ha with at the time of full bloom stage the yield obtained under application of biosil-de @ 500 kg/ha with at the time of full bloom stage was markedly superior over different doses applied at the time of vegetative growth and grain development stage.

CONCLUSION

Growth parameters particularly plant height, tillers/m², leaves/plant and LAI increased with the application of biosil-de @ 500 kg/ha. It also gave maximum grain and straw yield. Improvement in growth parameters and yield of grain and straw (45.74 and 92.49 q/ha.) were respectively recorded while

biosil-de was applied at full bloom stage. Application of biosil-de @ 500 kg/ ha at full bloom stage proved to be the best for getting maximum yield of grain (47.54 q/ha.) and straw (97.76 q/ha).

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