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EFFECT OF CHLOR-ALKALI SOLID WASTE EFFLUENT ON NUMBER OF TILLERS OF A LITTLE MILLET CROP

KEYWORDS Chlor-alkali factory, solid waste effluent, little millet, basal tiller, productive tiller.

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ABSTRACT *The little millet (Panicum sumatrense Rath ex. Roem and Schult) crop variety SS. 81-1, exposed to chlor-alkali solid waste effluent @ 100 g m^{-2} (treatment - 1),200 g m^{-2} (treatment - 2), 300 g m^{-2} (treatment - 3) and 400 g m^{-2} (treatment - 4) was studied in vivo at the Agriculture Research Station, Ankuspur in the District of Ganjam, Odisha at an interval of 15 days starting from 30 days after sowing (DAS) till harvest of the crop following the ICAR technology proposed by Seetharam (1994) with little modification depending upon the soil condition and climate of the locality. Maximum number of basal tiller was noticed during 87 days after sowing in all control and treated plants. However, no appreciable deviation in number of basal tiller was observed among control, treatment-1, treatment-2, treatment-3 and treatment-4, throughout the sampling period. The average number of productive tiller as well did not show any differences in all the beds. Compared to productive tiller, basal tiller showed less in number in all the beds during 87 DAS.*

Introduction

Millet in general is the staple food of tribals and also of the labour class in the eastern part of the state of Odisha. The crop withstands heavy rain and drought condition to a considerable extent. *Panicum sumatrense,* formerly known as *Panicum miliari* is one of the typical minor millet crop grown widely on the hill tops, hill slopes and also in the hill bases. Recently cultivation of this crop has also been taken up in the plains. Compared to other small millet, *Panicum sumatrense* has some unusual features. It has the capacity to withstand drought and water logging to a considerable extent. It does not need crop protection measures. Basically it is free from pest. It does not require either irrigation or fertilizer and pesticide. Simply the tribals broadcast the seed by hand with the onset of first rain and harvest after 85-90 days.

Literature Review

The degradation of environment due to industrial waste threatens the survival of living beings. Literature available revealed mostly the adverse effect of chlor-alkali solid waste on algae (Mishra **et al.** 1985, 1986), on fish (Shaw **et al.** 1985) and on rice (Nanda **et al.** 1993, 1994, 1996, Behera **et al.** 1995). So far as the little millet crop is concerned, some work has been done by Indian Council of Agricultural Research (lCAR, 1992-93, 1993-94, 1994-95, 1995-96 and 1996-97) under All India Coordinated Small Millet Improvement Project associated with various cooperative agencies for the development of crop productivity. Most of the investigation are confined to fodder and grain yield. However, no work has been done on the effect of chlor-alkali solid waste effluent on tiller number of a little millet crop. Therefore, in this investigation an attempt has been made to study the number of basal tiller and productive tiller of a little millet crop exposed to various concentration of chlor-alkali solid waste effluent with a view to management of waste in Agriculture.

Study site and Environment

The experiment was conducted at the Agriculture Research Station (a Research farm of Orissa University of Agriculture and Technology, Bhubaneswar, Odisha), Ankuspur (l9°46'N; 94°21'E) situated at a distance of about 25 km from the Bay of Bengal Coast, Odisha.

The climate of the experimental site was monsoonal with three distinct seasons i.e. rainy (July to October), winter (November to February) and summer (March to June). Out of 863.65mm of rain recorded during the year, a maximum of 28.8 per cent was observed in June. The mean minimum and mean maximum atmospheric temperature recorded during the year were found to be normal. The mean minimum temperature ranged from 15.4°C (December) to 26.13°C (May) whereas the mean maximum showed a range of 27.6°C (December) to 37.81 °C (May).

The soil of the experimental site was found to be sandy (75%) and acidic (pH = 6.58) in nature. The phosphorus and potassium contents of the soil were high (i.e., 9.0 and 46.6 ppm respectively) whereas the amount of organic carbon (%) was very low (0.35%). The solid waste of chlor-alkali factory (M/s. Jayashree Chemicals) applied in the field soil was found to be alkaline (pH=8.06). Textural analysis showed almost nil of sand, silt and clay. The waste soil exhibited a medium range of phosphorus and potassium contents. The organic carbon (%) of the waste was of very low order (Barik, 2016)

Materials and Methods

Twenty-five beds were prepared following the usual agricultural practice. Solid waste collected from the chlor-alkali factory was applied at the concentration of 100 g m^{-2}, 200 g m^{-2}, 300 g m^{-2} and 400 g m^{-2}and marked as treatment -1, 2, 3 and 4 respectively. The soil was mixed thoroughly in each bed and leveled. Five beds for each concentration and control were maintained. ICAR technology proposed by Seetharam (1994) was employed for cropping with little modification depending upon the soil condition and climate of the locality. The sampling was made at an interval of 15 days starting from 30 days after sowing (DAS) till harvest of the crop. Five plants were selected randomly from each control and treatments. The number of basal tillers of each plant in all treatments and control beds were counted, averaged and incorporated in this study.

Results and Discussion

Figure -1 represents the average number of basal tillers per plant in control and four treated beds on different days after sowing (DAS). The number of basal tillers ware found to be more during harvest i.e. on 87 DAS in all beds. However, no appreciable deviation in basal tiller number was observed among control, treatment-1, treatment-2, treatment-3 and treatment-4 beds throughout the sampling period i.e. on 30 DAS, 45DAS, 60DAS, 75DAS and 87 days after sowing (i.e. at harvest).

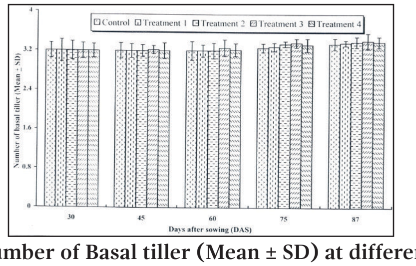

Fig 1: Number of Basal tiller (Mean ± SD) at different days after sowing

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The average number of productive tiller (Fig – 2) as well did not show any variation among control and treated beds. The productive tiller number exhibited almost the same value in all the beds. Compared to productive tiller, basal tiller showed less in number in control and all treated beds during 87 days after sowing.

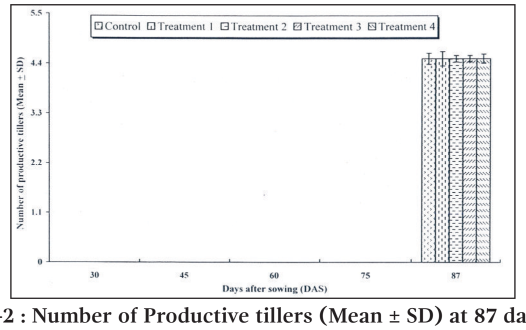

Fig -2 : Number of Productive tillers (Mean ± SD) at 87 days after sowing.

The variance ratio test relating to number of basal tillers and productive tillers did not show any significant differences (Table-1). This revealed that the waste soil had no effect on the number of basal tiller and productive tiller of the crop.

Table-1 : Variance ratio test on the number of basal tillers and productive tillers of a little millet crop exposed to solid waste effluent at different days after sowing (n=25).

Days after sowing	Number of Basal tillers	Number of Productive tiller
30	F=0.000 (NS)	-
45	F=0.019 (NS)	-
60	F=0.163 (NS)	-
75	F=0.831 (NS)	-
87	F=0.181 (NS)	F=0.000 (NS)

NS = Not Significant

The rain fall during the early growth period could perhaps have diluted the waste soil concentration applied in field soil, as a result, no such variation in average number of basal tiller and productive tiller were observed throughout the sampling period.

Conclusion

The chlor-alkali solid waste effluent at the concentration of 100 g m^{-2}, 200 g m^{-2}, 300 g m^{-2} and 400 g m^{-2} applied in the field soil might not have been detrimental for the little millet. As a result, no such variation in number of tillers was observed. In other wards the solid waste effluent of chlor-alkali factory applied in field soil up to the concentration of 400 g m^{-2} had no effect on the tiller number of little millet crop. However, this concentration of chlor-alkali solid waste effluent applied in the field would vary from place to place and also from crop to crop because of climatic variation of the place and also the genetic set up of the crop. Besides, the soil quality and soil amendment practices with modern improved technology also played major role in the detoxification of the solid waste concentration applied in the field soil.

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