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Effect of Chlor-Alkali Solid Waste Effluent on 50 Percent Flowering of A Little Millet Crop

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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. Days to 50 percent flowering did not show any variation. Plants in control and all treatments exhibited 50% flowering at 58 days after sowing. It indicates that the crop can tolerate the waste soil concentration applied in the soil. However, this concentration of chlor-alkali solid waste effluent used in field would vary from place to place and also from crop to crop because of soil quality and climatic variation of the place. Besides, the soil amendment practices with modern improved technology as well as the genetic set up of the crop might be responsible for detoxification of waste soil concentration applied in soil in some extent.*

KEYWORDS : Chlor-alkali factory, solid waste effluent, little millet, flowering

Introduction

The degradation of environment due to industrial waste threatens the survival of living beings. Literature available revealed mostly the adverse effects 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 (ICAR, 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 these investigations are confined to fodder and grain yield. However, no work has been done on the effect of chlor-alkali solid waste effluent on days to 50 percent flowering of little millet crop. Therefore, in this investigation an attempt has been made to study the days to 50 percent flowering of a little millet crop exposed to various concentration of chlor-alkali solid waste effluent.

Study site and Environment

The experiment was conducted at the Agriculture Research Station (a Research farm of Orissa University of Agriculture and Technology, Bhubanswar, 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 experimental 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 mean maximum showed a range of 27.6°C (December) to 37.81 °C (May).

The soil 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-2and 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 the 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 with a 30days period after sowing till the harvest of the crop. For the determination of days to 50 percent flowering, the plants in control and all treatments were carefully observed and recorded during the cropping.

Results and Discussion

The days to 50 per cent flowering of little millet (P.sumatrense) variety SS. 81-1 did not show any fluctuation. Plants in control and all treatments exposed to various concentration of chlor-alkali solid waste effluent showed 50 percent flowering at 58 days after sowing. When the present findings were compared to all India data for 50 percent flowering reported by ICAR (1996-97), it was observed that the local variety of Pandirimamidi and Rasthakuntabai of Andhra Pradesh and Waghai in Gujarat showed higher days of 50 percent flowering whereas the area i.e. Kanke in Bihar; Dahod in Gujarat; Bangalore and Hanumanamatti in Karnataka; Dindori, Jagadalpur and Rewa in Madhya Pradesh and Coimbatore in the state of Tamil Nadu experienced lower days to 50 percent flowering (Table – 1). This fluctuation in days to 50 percent flowering from place to place might be due to the climatic fluctuation, the variety used, genetic set up of the crop, date of sowing of the crop and soil quality of the locality.

Table- 1. Days to 50 percent flowering of little millet (local variety) at various climatic regions.

Sources	State (s)	Location (s)	Days to 50 % flowering
ICAR (1996-97)	Andhra Pradesh	Pandirimamidi Rasthakuntabai	75 65
	Bihar	Kanke	33
	Gujurat	Dahod Waghai	40 93
	Karnataka	Bangalore Hanumanamatti	37 42
	Madhya Pradesh	Dindori Jagadalpur Rewa	45 53 45
	Orissa	Berhampur	57
	Tamil Nadu	Coimbatore	53
This Study	Orissa	Berhampur- Control Treatment-1 Treatment-2 Treatment-3 Treatment-4	58 58 58 58 58

Conclusion

The days to 50 percent flowering of little millet crop exposed to chlor-alkali solid waste effluent did not show any variation among the control and treatments. 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. Moreover, the soil quality, soil amendment practices with modern improved technology and date of sowing of the crop play vital role in the detoxification of the waste soil concentration in soil.

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