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Effect of Chlor-Alkali Solid Waste Effluent on Days to Maturity of A Little Millet Crop

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 maturity of the crop did not show any fluctuation. Plants in control and all treatments matured at 78 days after sowing. It revealed that the crop could resist 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. Moreover, the soil amendment practices by modern improved technology as well as the genetic set up of the crop also play a vital role for detoxification of waste soil concentration applied in soil in some extent.

Keywords: Chlor-Alkali Factory, Solid Waste Effluent, Little Millet, Days to Maturity..

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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 also 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.

Aim of the Study

The aim of this investigation is to find out the effect of chlor-alkali factory solid waste effluent on days to maturity of a little millet crop with a view to waste management in Agriculture.

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 (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 this investigation is confined to fodder and grain yield. However, no work has been done on the effect of chlor-alkali solid waste effluent on days to maturity of little millet crop..

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.

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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 $m^{-2}$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 days to maturity in control and each treatment were observed carefully and recorded before the harvest of crop.

Results and Discussion

The days to maturity 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 matured at 78 days after sowing. The days to maturity reported by ICAR (1996-97) when compared with the present findings (Table – 1) showed that, the local variety of Pandirimamidi and Rasthakuntabai in the state of Andhra Pradesh, Dahod and Waghai in Gujarat, Hanumanamatti in Karnataka and Coimbatore in Tamil Nadu were on the higher side whereas the area i.e. Kanke in Bihar; Dindori, Jagadalpur and Rewa in Madhya Pradesh exhibited lower days to maturity of the crop. This variation in days to maturity from place to place was probably due to climatic fluctuation, variety used, genetic set up of the crop, date of sowing of the crop and soil quality of the locality.

Conclusion

The days to maturity of little millet crop did not show any variation among the control and treatments exposed to chlor-alkali solid waste effluent applied in the field soil. However, this concentration of chlor-alkali solid waste effluent used 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 played major role in the detoxification of the waste soil concentration in soil.

Table- 1

Days to maturity of little millet (local variety) at various climatic regions.

Sources	State (s)	Location (s)	Days to maturity
ICAR (1996-97)	Andhra Pradesh	Pandirimamidi	98
		Rasthakuntabai	105
	Bihar	Kanke	61
	Gujurat	Dahod	85
		Waghai	132
	Karnataka	Hanumanamatti	80
	Madhya Pradesh	Dindori	67
		Jagadalpur	77
		Rewa	72
	Orissa	Berhampur	76
	Tamil Nadu	Coimbatore	86
This Study	Orissa	Berhampur-	
		Control	78
		Treatment-1	78
		Treatment-2	78
		Treatment-3	78
		Treatment-4	78

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