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Effect of Soil Solarization on Weeds and Nurseries of Brinjal and Chilli

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Vegetable nurseries are subject to damage or complete losses by various factors, including soil-borne microorganisms–weeds, insects and mites. In vegetable nurseries, frequent irrigation and application of organic manure invite repeated weed flushes, which are expensive to control manually and remove large amount of nutrients from soil. Weed control through herbicide has harmful effect on germinating nursery seedlings and herbicidal residues in edible plant parts may cause severe mammalian toxicity. Moreover, vegetable nurseries are highly sensitive to agro chemicals. Based on these concepts, soil solarization technique came into existence.

During solarization period, effective solar heating of soil takes place due to transmittance of solar radiation and soil temperature increases between 8 and 15°C at a depth of 20 cm, in heavy clay and sandy soil, respectively (Satour *et al.*, 1991). The lethal level of soil temperature achieved during soil solarization is believed to be responsible for killing germinating weeds and weed seeds reserve in the soil. Control of weeds through soil solarization is more for broad-leaved weeds as compared to grasses and sedges (Reddy *et al.*, 1998). The main advantage of this technique is that nursery seedling germinates in weed-free environment as well free from soil-borne pests such as diseases–fungi, bacteria and nematodes. This technique is non-hazardous to user as well as to environment.

The field experiment was carried out at I. A. R. I. Regional Station, Karnal during summer 2000 and 2001 in complete randomized block design with six replications on clay loam soil to study the effect of soil solarization for control of weeds in nurseries of brinjal and chilli. The nursery beds of 1.2 x 2.4 m were prepared and given light irrigation to hasten weed germination. The beds were covered with the polythene sheets of 100 mm gauge for six weeks. The polythene sheets were removed and seeds of brinjal and chilli cultivars Pusa Kranti and Pusa Sadabahar, respectively, were sown with little disturbance at 375-500 g and 1 kg for brinjal and chilli, respectively.

Weed flora of the experimental field consisted of *Cyperus rotundus, Eleusine indica, Echinochloa colona, Cenchrus ciliaris, Trianthema monogyna, Parthenium hysterophorus, Tribulus terrestris* and *Euphorbia hirta.* The effect of soil solarization was greater in the controlling broad-leaved weeds. The extent of control with grasses and sedges was not same as that of broad-leaved weeds. Control of *C. rotundus* was 63-65%, whereas *E. colona, E. indica* and *C. ciliaris* were controlled more than 80% in brinjal and chilli crop. The dry weight of weeds at the harvesting of nursery was reduced by 96% in brinjal as compared to weedy check (Table 1). Similarly, dry weight in chilli was reduced by 95%. This is because during mulching period effect solar heating of soil took place due to transmittance of solar radiation and soil temperature increased by 5-10°C. By the soil solarization, the dry weight of 20 seedlings was 16.98 and 3.085 g in brinjal and chilli nursery as compared to 1.092 and 0.268 g in weedy check (Table 1). This is because nursery seedling germinated in weed-free environment as well free from soil-borne pests. These results indicated that soil solarization of seedbed

Table 1. Effect of solarization on weed density, weed dry weight, fresh weight and dry weight of vegetable nurseries

Weed density	Brinjal						Chillies					
(No. m^{-2})	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
	Untreated	Solarized	Untreated	Solarized	LSD (P=0.05)	LSD (P=0.05)	Untreated	Solarized	Untreated	Solarized	LSD (P=0.05)	LSD (P=0.05)
Cyperus rotundus	360	60	440	152	-	-	340	120	380	116	-	-
Eleusine indica	520	12	440	60	-	-	456	16	336	12	-	-
Echinochloa colona	264	0	192	8	-	-	236	24	160	8	-	-
Cenchrus ciliaris	236	0	200	32	-	-	260	60	196	32	-	-
Trianthema monogyna	12	0	40	8	-	-	60	8	116	20	-	-
Parthenium hysterophorus	112	12	52	8	-	-	140	24	88	16	-	-
Tribulus terrestris	56	8	40	12	-	-	36	8	0	0	-	-
Euphorbia hirta	60	4	100	0	-	-	80	8	21	0	-	-
*Total weed density (No. m^{-2})	40.26	9.98	38.79	16.76	1.81	4.30	40.11	16.40	36.02	14.31	3.30	5.29
Weed dry weight (g m^{-2})	523.40	13.0	433.2	15.0	58.47	47.48	591.8	17.8	526.8	26.4	54.23	42.01
Fresh weight/20 seedlings (g)	6.89	228.06	6.80	122.69	13.01	14.27	4.51	48.71	1.46	9.78	10.94	1.87
Dry weight/20 seedlings (g)	1.116	31.57	1.092	16.28	3.41	5.29	0.82	15.35	0.27	3.08	2.58	0.79

*Total weed density values transformed $\sqrt{n+1}$.

nurseries of brinjal and chilli were very effective in controlling weeds.

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