

Research Article

Corn Flour as Weed Control Agent: Effect on Crops and Weed Seeds Germination

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Abstract

Pot culture experiment was conducted at Tamil Nadu Agricultural University, Coimbatore district, Tamil Nadu to study the effect of different doses of corn flour on germination of weed and crop seeds. The treatment consisted of different doses of corn flour viz., 10, 20, 30 and 40 g along with control. Weed seeds such as *Abutilon indicum*, *Parthenium hysteroporus*, *Amaranthus viridis*, *Trianthema portulacastrum*, *Cyperus rotundus*, *Cynodon dactylon* and crop seeds such as maize, blackgram, greengram, cowpea and pearl millet were sown and the germination percentages was taken and also dry weight of weed and crop seeds were taken on 12 Days After Sowing in the pots. From the experiment results, corn flour @ 40g per pot controlled the germination of crop and weeds seeds and also significantly recorded lower dry weight of both the crop and weed seedlings at 12 DAS.

Keywords: Pre Emergence, corn flour, weed and crop seeds germination

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Introduction

Concern over the long-term environmental effects of synthetic agricultural chemicals has led to increased efforts in the search for natural products [1]. Organic farmers cite weeds as the most significant production problem they encounter and total crop losses from weeds can occur under the organic system. Perennial weeds increase under organic husbandry. One analysis of the relative frequency of weeds three years, 4050 to 17320 m² in organic farming systems. Chemical intervention is not permitted for weed control purposes in organic farming systems the lack of research on non-chemical options for weed management has made weeds a serious problem in organic farming. Extensive use of organic manures in the organic farming systems results in buildup of soil weed seed bank. Weed-crop competition relationships differ (Organic & Conventional) and organic systems tolerate a greater abundance of weeds compared to conventional systems. Allelopathic chemicals found in natural products might be used as weed seed emergence killer and to develop new classes of synthetic herbicides based on natural chemicals [2]. Corn flour has been identified as an effective natural preemergence herbicide in turf and crops [3-5]. Mc Dade and Christians (2000) [6] stated that in addition to organic mulches, there are a limited number of organically approved products, such as corn gluten meal, that have been shown to exhibit herbicidal properties. Corn flour can be used as a pre emergence herbicide in transplanted crops because corn flour contains a biologically active dipeptide compound called Alanyl-Alanine, a potent inhibitor of rooting, which brings morphological, physiological and anatomical changes in root cells of germinating seeds and inhibits the root growth [3]. Application of corn meal gluten controls the broad leaved weeds as well as grasses [7]. Hence corn flour is recommended for transplanted crops only because it affects the root formation of germinating seeds since it has herbicidal activity.

Pre emergence application of corn flour will provide effective weed control. Among several non chemical weed management practices, application of corn flour is a new innovative method offering broad spectrum weed control. Hence, the present investigation was taken up to study the effect of different doses of corn flour on germination of crop and weed seeds.

Materials and Methods

The pot culture experiment was conducted at Tamil Nadu Agricultural University, Coimbatore district, Tamil Nadu. The experiment was laid out in completely randomized plot design and replicated thrice. The different doses of corn flour viz., 10, 20, 30 and 40 g were taken accordingly. Pots of size 20 cm diameter (circumference of the circle $2\pi r$, was used to calculate the corn flour dose) were taken and filled with native field soil. Weed seeds such as *Abutilon*

indicum, *Parthenium hysteroporus*, *Amaranthus viridis*, *Trianthema portulacastrum*, *Cyperus rotundus*, *Cynodon dactylon* and crop seeds such as maize, blackgram, greengram, cowpea and pearl millet were sown. Corn flour was trenched with different doses of 10, 20, 30, 40 g and control was also maintained. The control pots were kept undisturbed for the entire experimental period. Observations on germination percentage and dry weight of weed and crop seeds were taken on 12 days after sowing. The critical difference at 5% level of significance was calculated to find out the significance of different treatments over each other [8].

Results and Discussion

The result of pot culture experiment revealed that, application of corn flour influenced the germination of crop and weed seeds as well as dry weight. Among different doses of corn flour treated pots (10 g, 20 g, 30 g and 40 g) the 40 g treated pots registered less germination and low growth of weeds and crops and this in turn returned on the dry weight of both on 12 DAS. The germination percentage of *Abutilon indicum* (5.9%), *Parthenium hysteroporus* (6.1%), *Amaranthus viridis* (5.1%), *Trianthema portulacastrum* (4.4%), *Cyperus rotundus* (9.9%), *Cynodon dactylon* (7.9%) were recorded in 40 g corn flour dose. The crop seeds also showed less germination percentage of 40 g corn flour applied pots which were followed by 30 g corn flour dose; Maize (6.1%), blackgram (6.7%), greengram (5.2%), cowpea (7.3%) and pearl millet (6.3%). Moderate germination percentages were observed in 20 g and 10 g of corn flour doses. The crop and weed seeds in control showed higher germination percentage than various doses of corn flour (Tables 1 and 2).

Table 1 Effect of corn flour application on germination of weed and crop seeds in pot culture experiment

Treatment	Germination Percentage of Weeds (%)						Germination Percentage of Crop seeds (%)				
	<i>Abutilon indicum</i>	<i>Parthenium hysteroporus</i>	<i>Amaranthus viridis</i>	<i>Trianthema. portulacastrum</i>	<i>Cyperus rotundus</i>	<i>Cyanodon dactylon</i>	Maize	Black gram	Green gram	Cow pea	Pearl millet
10 g	79.5	85.2	90.3	82.3	93.5	82.3	94.3	95.3	91.4	93.3	91.7
20 g	59.1	69.4	72.6	54.9	80.4	64.7	90.7	86.9	89.9	91.7	69.8
30 g	17.1	21.6	18.7	20.8	30.6	23.8	20.2	26.4	19.8	25.1	20.8
40 g	5.9	6.1	5.1	4.4	9.9	7.9	6.1	6.7	5.2	7.3	6.3
Control	92.0	94.8	97.7	96.6	90.8	90.8	97.2	97.2	97.7	97.4	97.2
SEd	2.7	2.9	2.8	2.5	3.1	2.8	3.3	3.1	2.8	3.6	3.4
CD (P=0.05)	5.2	6.1	5.9	5.2	6.4	5.9	6.9	6.7	6.1	7.4	6.9

Table 2 Effect of corn flour application on dry weight of weeds and crops in pot culture experiment on 12 DAS

Treatment	Dry weight of Weeds (mg)						Dry weight of Crops (mg)				
	<i>Abutilon indicum</i>	<i>Parthenium hysteroporus</i>	<i>Amaranthus viridis</i>	<i>Trianthema. portulacastrum</i>	<i>Cyperus rotundus</i>	<i>Cyanodon dactylon</i>	Maize	Black gram	Green gram	Cow pea	Pearl millet
10 g	967	887	881	925	698	726	560	433	341	472	386
20 g	793	707	693	835	567	619	497	380	298	466	244
30 g	386	327	340	365	293	332	345	185	170	220	180
40 g	98	103	89	82	98	84	98	93	86	93	81
Control	1049	995	1073	988	764	804	604	479	403	511	398
SEd	34	30	31	32	25.	26	21	16	13	17	12
CD (P=0.05)	70	61	63	66	51	53	45	34	27	36	25

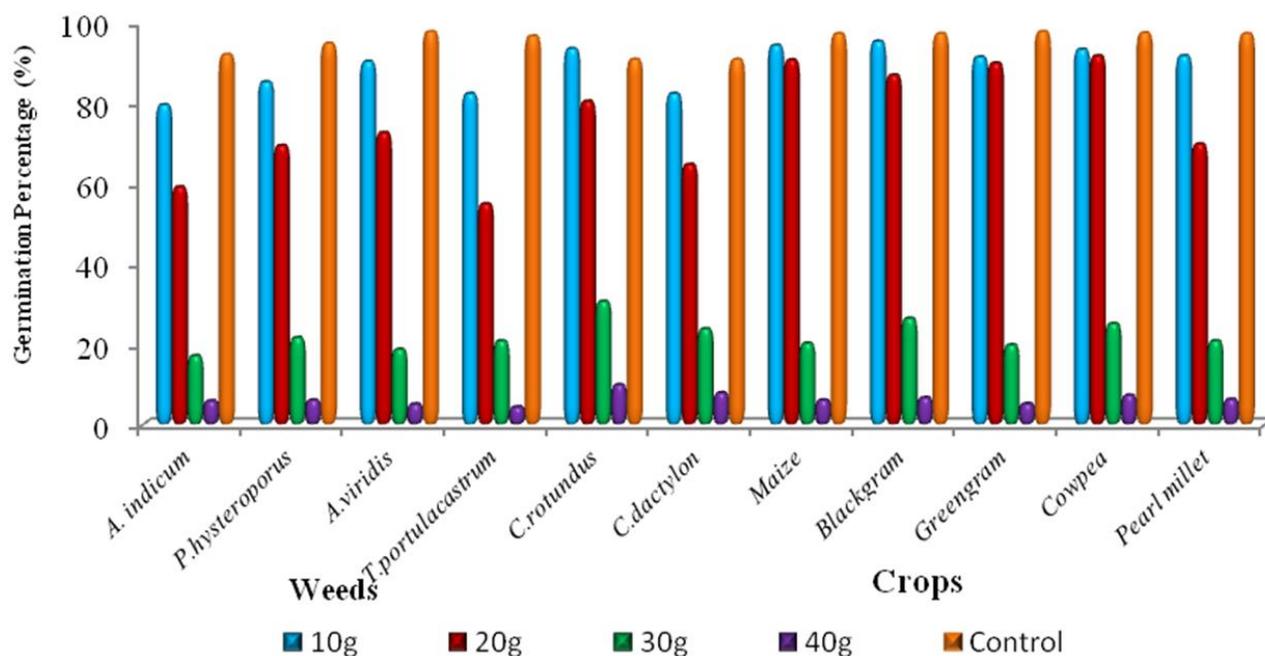


Figure 1 Effect of corn flour application on germination of weed and crop seeds in pot culture experiment

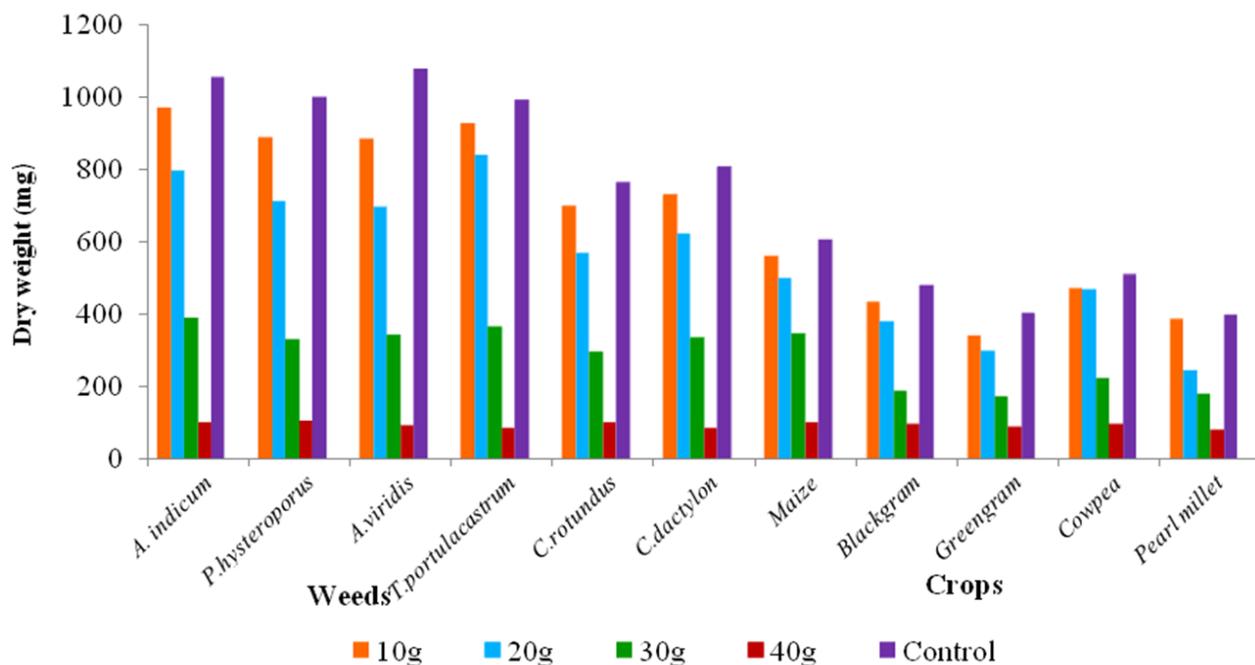


Figure 2 Effect of corn flour application on dry weight of weeds and crops in pot culture Experiment on 12 DAS

The dry weight of weed and crops were less in 40 g of corn flour dose. The dry weight of *Abutilon indicum* (98 mg), *Parthenium hysteroporus* (103 mg), *Amaranthus viridis* (89 mg), *Trianthema portulacastrum* (82 mg), *Cyperus rotundus* (98 mg), *Cynodon dactylon* (84 mg) were recorded in 40g dose of corn flour in weeds and in crop seeds such as maize (98 mg), blackgram (93 mg), greengram (86 mg), cowpea (93 mg) and pearl millet (81 mg). Moderate dry weight of crop and weeds were recorded in 30 g and 20 g of corn flour doses. Control showed significantly higher weed dry weight of crop and weeds than other doses. Higher the doses of corn flour applied reduced the seed

germination (**Figures 1-3**). This might be due to inhibition of root growth of weeds and crops by the corn flour. This corroborate with results of Melissa *et al.* (2002) [9] and Webber *et al.* (2010) [10]. This result also coincides with findings of Linda Naeve (2005) [11] who reported that corn meal gluten is used to control germinating weed seeds by inhibiting the rooting of germinating seeds. Hence, application of corn flour at 1 ton ha⁻¹ will control the germination of weed and crop seeds.



Figure 3 Effect of corn flour on germination of crop and weed seeds in pot culture experiment

Conclusion

Based on the result of the experiment conducted, it is concluded that, pre emergence application of corn flour @ 1 tonne/ha recorded lower germination percentage and dry weight of both crop and weed seeds and thus it can be very well used as pre emergence herbicide in transplanted crops.

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Publication HistoryReceived 18th Apr 2017Revised 06th May 2017Accepted 10th May 2017Online 30th May 2017