

## Original Research Article

### Allelopathic effect of aqueous and ethanolic extracts of some common weeds on seed health of *Triticum aestivum* L. (Wheat)

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#### ABSTRACT

The present study was conducted to investigate the allelopathic effects of aqueous and ethanolic common 10 weed (*Alternanthera sessilis* (L.) R.Br,ex DC, *Amaranthus tricolor* L., *Cardiospermum helicacabum* L., *Corchorus olitorius* L., *Cyperus rotundus* L., *Euphorbia heterophylla* L., *Euphorbia hirta* L., *Phyllanthus amarus* Schumach. & Thonn. , *Portulaca oleracea* L., *Vicoa indica* (L.) DC.) extracts on Seed health (incidence of seed mycoflora, seed germination and seedling emergence, root and shoot length) of Wheat var. local under laboratory conditions. The result observed that the aqueous leaf extract of *Euphorbia hirta* L. showed highly reduced seed mycoflora and stimulatory for seed germination, seedling emergence, root length and shoot length as compared to the other weed plant extract and control. It is followed by *Portulaca oleracea* L. (root, stem and leaf extracts). The medium effect observed in extract of *Alternanthera sessilis* (L.) R.Br,ex DC and minimum result were observad in both root extracts of *Cyperus rotundus* L. The aqueous root, stem and leaf extracts of *Amaranthus tricolor* L. and *Cardiospermum helicacabum* L. showed bad effect on seed health. The result is demonstrated the allelopathic potential of ten common weeds in same wheat field and suggested that those weeds may affect wheat seed health due to inhibitory or stimulatory effect of allelochemicals which are present in the extract of weeds.

#### Keywords

Allelopathic effect;  
common weeds;  
wheat;  
seed health;  
inhibitory;  
stimulatory.

#### Introduction

Weed is a serious pest that damages most of the crops and grain and is everlasting problem for our agriculture. Weeds present in crop field that compete with crop plants for light, moisture and other essential nutrients, resulting reduce quality and yield of crops and increase the cost of production. Under selected environmental conditions, the active form may be

effects. Chemicals with Allelopathic potential are present in a variety of plant tissues, including leaves, flowers, fruits, stems, roots, rhizomes, and seeds (Putnam, 1987). Weeds cause annual losses of about 10% in agricultural production (Anderson, 1987). Some weed species supplement aggressiveness by production of phytotoxic or plant growth-inhibiting substances that adversely affect growth

and development of other plants. These chemicals are released into the soil as root exudates of the living or dead plants (Ghafoor and Sadiq, 1991; Retta *et al.*, 1991).

Wheat (*Triticum aestivum*, family poaceae) is a rabbi season food crops and the basic staple food of the world. Today, wheat is grown on more land area than any other commercial crop and continues to be the most important food grain source for humans (Sazada *et al.*, 2009). The present investigation was made to study the Allelopathic effect of aqueous and ethanolic extracts of some common weeds on seed health of *Triticum aestivum* L. (Wheat) Var. local. This weeds we will be utilize it properly particular in the welfare of the crop plants.

## **Materials and Methods**

### **Collection and Identification**

The laboratory experiment had conducted in Department of Botany, Yeshwant Mahavidyalaya, Nanded to determine the allelopathic effect of some common weed extracts on seed germination and seedling growth of wheat crop of Nanded district. The common and dominant weeds were collected in wheat field from Rabbi Season for this experiment. The fresh weeds in its vegetative stage were collected from wheat fields. The collected plants are identified by using "The Flora of Marathwada" (Naik, 1998). We have also made herbarium and stored in Herbarium Section of Department of Botany, Yeshwant Mahavidyalaya, Nanded (M.S.).

### **Preparation of powder**

The collected weed separated in the form

of root, stem and leaves air dried in shade for a week and prepare powdered with the help of mixer grinder. The powder of the weed parts were separately packed in polyethene bags and store at room temp before used for experiment.

### **Preparation of plant extracts**

The aqueous and ethanolic extracts of the root, stem and leaf powders of the test weeds were prepared by Soxhlet extraction method as described by Khandelwal (2010).

### **Bioassay**

From preliminary screening it was found that root, stem and leaf extracts had the strongest allelopathic effect on seed health (incidence of seed mycoflora, seed germination and seedling emergence, root and shoot length), therefore first selected these three part of the weeds (root, stem and leaves) for the detail experiment in laboratory basis.

The seeds of Wheat were soaked in 5% aqueous and ethanol extracts of the weed plants for 24 hours at room temperature. The soaked seeds were plated on moist blotter plates methods as described by Neergaard (1977) and Agarwal (1981), incubated for ten days at room temperature and the incidence of seed mycoflora, seed germination were studied. Similarly the soaked seeds were sown in trays/ pots filled with garden soil, incubated for ten days at room temperature and the seedling emergence (root length and shoot length) was studied.

The seeds soaked in sterile distilled water were termed as control. The results obtained are presented in table and photo plates.

## Results and Discussion

From the results observed in table and photo plate it is clear that, the aqueous leaf extract of *Euphorbia hirta* L. showed highly reduced seed mycoflora and stimulatory for seed germination, seedling emergence, root length and shoot length as compared to the other weed plant extracts and control. It followed by aqueous and ethanolic root, stem extracts of *Euphorbia hirta* L. and *Portulaca oleracea* L.

The seeds soaked in ethanolic stem and leaf extracts of *Alternanthera sessilis* (L.) R.Br,ex DC were found in minimum seed mycoflora on the wheat seeds and stimulatory for seed seedling growth. The aqueous root, stem and leaf extracts of *Amaranthus tricolor* L., *Cardiospermum helicacabum* L., were stimulatory for seed mycoflora and inhibitory for seed germination and seedling growth. Similarly both root extracts of *Cyperus rotundus* L. was found in reduced seed mycoflora, seed germination and seedling emergence, root and shoot length as compared to other extracts and control. The aqueous and ethanolic root, stem and leaf extract of *Euphorbia heterophylla* L. was found in moderately effect on seed health as compared to other plant extracts (Table 1; Figure 1). In similar Rambakudzibga (1991) reported that the water extract of wheat inhibited the germination of *Potulaca oleracea* and *Amaranthus hybridus* seeds. Qasem (1993) found that some weed like *Amaranthus spinosus* and *Chenopodium album* had allelopathic effect on maize and barley growth. The allelopathic effects of five weed species viz., *Polygonum hydropiper* L. (W1), *Amaranthus spinosus* L. (W2), *Chenopodium album* L. (W3), *Cyperus rotundus* L. (W4) and *Imperata cylindrica* L. (W5) on corn (cv. Barnali) seed

germination, growth and development were studied (Samad *et al.*, 2008). Dharmaraj *et al.*, (1988) reported that root and shoot of *Amaranthus viridis* and *Portulaca oleracea* caused greater reduction in sorghum seed germination. The seed germination and seedling growth of pearl millet, turnip, corn, wheat, carrot and mustard were inhibited by aqueous extract of *Anagallis arvensis* (Zenab *et al.*, 2001). In competition with *Chenopodium album* for potassium (K), 25.59% reduction in grain yield of wheat was observed by Tanveer *et al.*, (2001). Schumacher *et al.*, (1982) found that water extracts from 23 common weed and crop species inhibited germination and growth of wheat seedlings. Similarly Bhatia *et al.*, (1982) studied the allelopathic effects of some weeds on wheat. *Chenopodium album* L. and *amaranthus viridis* L. inhibited the growth of wheat seedlings. Similar work has been carried out by different workers such as Li-fu Ning (1996), Challa and Ravindra (1998), Cheema and Kaliq (2000), Dongre *et al.*, (2004), Kayode (2006), Dalvi (2010), Ghodake *et al.*, (2012).

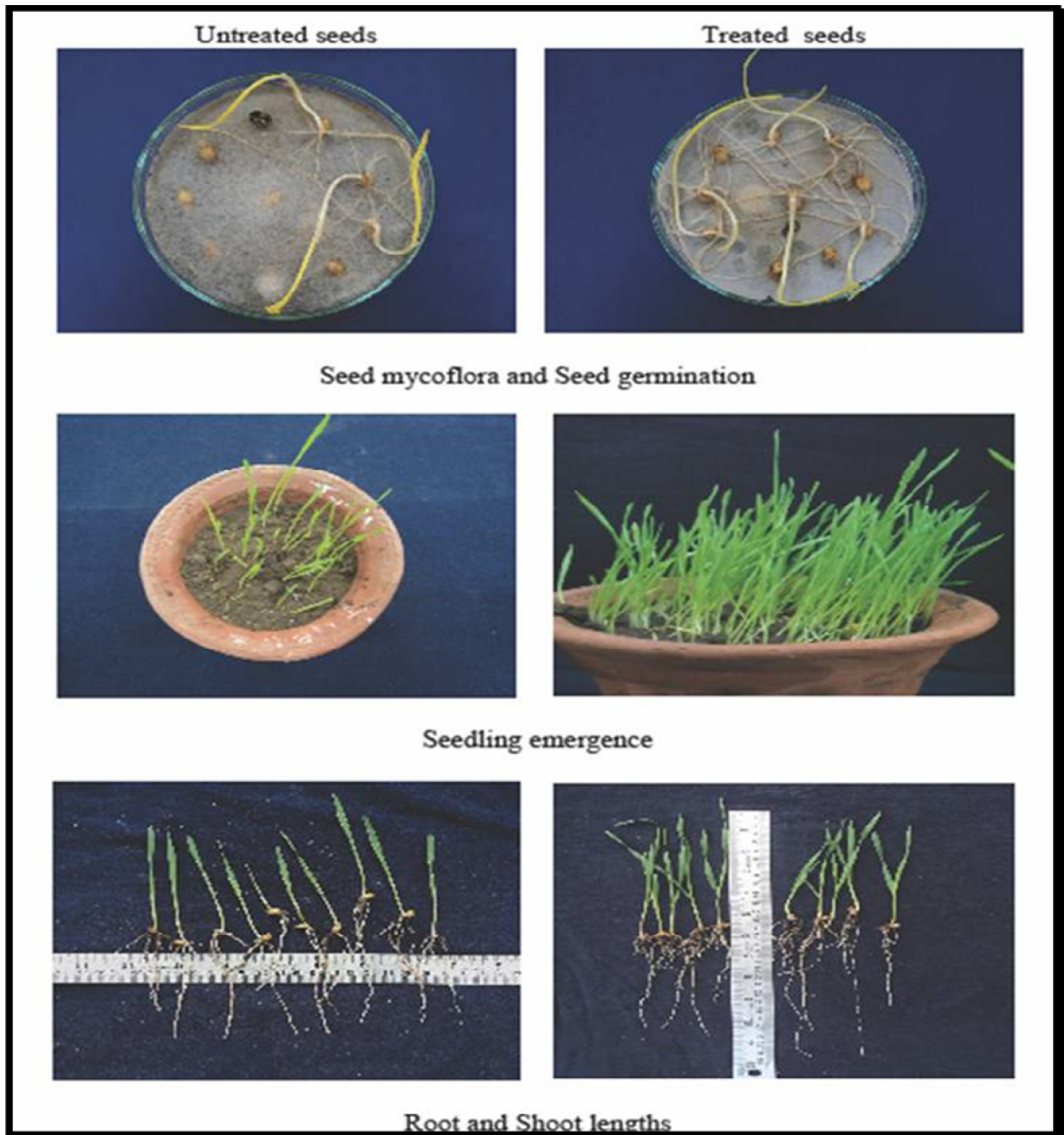
Aqueous and ethanolic extracts of *Euphorbia hirta* L., *Portulaca oleracea* L. and *Alternanthera sessilis* (L.) showed minimum incidence of seed mycoflora and stimulatory for seed germination and seedling emergence, root and shoot length as compared to other extracts and control. But the aqueous root, stem and leaf extracts of *Amaranthus tricolor* L. and *Cardiospermum helicacabum* L. showed bad effect on seeds health of wheat crop. The extract of all the test weed plants were found to be inhibitory in more or less degree for the incidence of seed mycoflora. While with a few exceptions, they were found to be stimulatory for the seed germination and seedling emergence.

**Table.1** Effect of aqueous and ethanolic extract of some common weeds on Seed health (incidence of seed mycoflora, seed germination and seedling emergence, root and shoot length) of Wheat var. local after ten days of incubation

S.No.	Name of the source weed plant	Part used	Mycoflora Incidence (%)		SG (%)		RL (cm)		SL (cm)		SE (%)	
			We	Ee	We	Ee	We	Ee	We	Ee	We	Ee
1.	<i>Alternanthera sessilis</i> (L.) R.Br,ex DC	Root	40	50	60	70	4.2	3.5	5.2	5.0	65	88
		Stem	25	40	80	80	2.1	6.2	3.2	4.1	80	87
		leaves	30	20	60	80	2.4	3.9	2.7	3.9	81	85
2.	<i>Amaranthus tricolor</i> L.	Root	100	30	10	60	0.9	2.8	9.6	1.2	22	20
		Stem	100	40	50	40	1.6	1.4	1.8	1.9	56	27
		leaves	90	30	30	40	1.9	2.1	2.0	2.7	35	32
3.	<i>Cardiospermum helicacabum</i> L	Root	80	60	40	50	0.8	1.0	2.3	1.2	32	30
		Stem	100	50	30	50	1.0	1.5	1.2	1.8	37	35
		leaves	80	50	20	60	2.5	1.2	0.6	7.0	44	45
4.	<i>Corchorus olitorius</i> L.	Root	40	30	70	50	3.6	2.1	3.2	2.1	80	74
		Stem	70	40	60	60	2.9	2.5	3.7	1.8	76	61
		leaves	50	20	60	60	3.1	1.0	4.1	1.4	69	60
5.	<i>Cyperus rotundus</i> L.	Rhizome	20	30	40	20	1.2	0.5	3.1	1.2	28	17
		leaves	60	40	60	50	1.8	2.3	2.5	1.5	81	44
6.	<i>Euphorbia heterophylla</i> L.	Root	30	30	40	40	1.5	1.8	1.4	1.3	42	40
		Stem	40	40	50	50	2.4	1.7	3.2	1.3	57	51
		leaves	30	40	70	50	1.0	1.5	1.1	1.8	74	80
7.	<i>Euphorbia hirta</i> L.	Root	10	20	90	80	5.4	3.1	4.9	3.8	90	89
		Stem	20	30	80	90	4.0	3.5	4.6	3.1	95	93
		leaves	10	10	90	70	5.8	3.9	5.7	4.5	98	95
8.	<i>Phyllanthus amarus</i> Schumach. & Thonn.	Root	40	40	80	40	1.5	2.4	4.1	2.7	70	65
		Stem	60	50	50	60	3.8	2.8	3.9	2.5	80	59
		leaves	30	30	80	70	3.2	2.4	2.8	4.3	87	77
9.	<i>Portulaca oleracea</i> L.	Root	20	10	70	90	3.5	4.5	4.9	5.2	92	79
		Stem	20	20	80	70	2.9	3.5	5.0	5.3	90	85
		leaves	30	00	80	80	3.7	6.2	4.2	8.9	87	76
10.	<i>Vicoa indica</i> (L.) DC.	Root	50	40	60	80	3.2	3,0	3.1	1.7	75	75
		Stem	70	50	50	50	2.1	2.9	3.6	1.5	80	69
		leaves	40	30	70	60	2.5	2.8	3.7	1.2	78	63
11.	Control	control	70	60	90	70	6.3	5.2	7.5	4.9	97	85

We = Water extract, Ee = Ethanol extract, SG= Seed germination, RL= Root Length, SL= shoot Length, SE= Seedling Emergence

**Figure.1** Effect of leaf extract of *Euphobia hirta* L. on seed mycoflora, seed germination, seedling emergence, root length and shoot length of Wheat var. local after ten days incubation.



However, more Research needed to confirm the allelopathic potential of weed species on seed germination and seedling growth of wheat in a natural environment.

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