

## Research Article

# Allelopathic Effect of Some Common Weed Extracts on Seed Germination and Seedling Growth of *zea mays* L. (maize) var. Local.

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## ABSTRACT

The present study was conducted to investigate the allelopathic effects of some 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 (aqueous & ethanolic) on seed germination and seedling growth of maize (*Zea mays* L.) Var. Local under laboratory conditions. The seeds soaked in aqueous leaf extract of *Phyllanthus amarus* Schumach. & Thonn showed much reduced incidence of seed mycoflora and more seed germination, seedling emergence, root length and shoot length of maize. It is followed by *Portulaca oleracea* L., *Euphorbia hirta* L. Some extract showed completely incidence of seed mycoflora on maize seeds. The root, stem and leaf extract of *Cardiospermum helicacabum* L. showed stimulatory for seed mycoflora and inhibitory for seed germination, seedling emergence, root and shoot length as compared to other plant extracts and control. The result is demonstrated the allelopathic potential of ten common weeds in same maize field and suggested that those weeds may affect maize seed germination and seedling growth due to inhibitory or stimulatory effect of allelochemicals which are present in the extract of weeds.

**Keywords:** Allelopathic effects, common weeds, *Zea mays* L., seed germination, seedling growth.

## INTRODUCTION

Jethro in 1731, defined first time a term "Weed" as 'a plant growing where it is not desired' in his much esteemed book 'Horse Hoeing Husbandry'. The weeds are very common, dominant and spread in any crop fields. They spread like wildfire and grow abundantly in the crop fields and harm to the main crop. The weeds are common dominant, unwanted, undesirable and plant that compete with cultivated crop for water, nutrient and sunlight and another several reasons such as, high growth rate, high reproductive rate and produce harmful or beneficial allelopathical effect of cultivated crops. (Qasem and Foy 2001).

Rice (1974) defined allelopathy as any direct or indirect harmful or beneficial effect by one plant to another through the production of chemical compounds. The allelopathic substances are most commonly found in plant extracts and in plant residues of soil, some are found in live plant exudates and as volatile gases liberated from roots, stems, leaves, rhizome, flowers, fruits and seeds (Rice, 1984; Willis, 1994; Batish *et al.*, 2007; Duke *et al.*,

2007; Asgharipour and Armin, 2010). These allelochemical directly affect on seed germination and seedling growth (Brown *et al.*, 1991; Hussain *et al.*, 2007; Naseem *et al.*, 2009). Many workers have conducted this type of study in laboratory basis (Bhowmik & Doll, 1984; Oyun, 2006; Gupta *et al.*, 2012). Therefore the urgent need to the detail study of weeds of the same crop field and their proper utilization particularly in the welfare of the crop plants. The objective of this study was therefore to determine the effect of extract of weed on seed mycoflora, seed germination and seedling growth of maize crop.

## MATERIAL 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 Maize crop. Weeds were collected in Maize field from kharif season for this experiment. The fresh weeds in its vegetative stage were collected from Maize 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. The powder of the weed biomass 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).

#### Experiments

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

The seeds of Maize 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.

#### RESULT AND DISCUSSION

From the results presented in table and photo plates it is clear that, the root, stem and leaf extract of all the test weed plants were found to be inhibitory for the fungal incidence on the seeds. Some plant extracts were found stimulatory and some inhibitory for seed germination and seedling emergence of the Maize.

The seeds soaked in aqueous leaf extract of *Phyllanthus amarus* Schumach. & Thonn. , aqueous and ethanolic root, stem and leaf extract of *Portulaca oleracea* L. showed much reduced incidence of seed mycoflora and more seed germination, seedling emergence, root length and shoot length of maize. The seeds soaked in aqueous root, stem and leaf extract of *Euphorbia hirta* L., showed reduced incidence of seed mycoflora and stimulatory effect of seed germination, seedling emergence, root length and shoot length. The root and shoot was not found in *Alternanthera sessilis* (L.) R.Br,ex DC except root length of aq. Root extract.

**Table: 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 Maize 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	00	00	20	40	0.5	00	00	00	57	40
		Stem	00	00	40	30	0.7	0.6	0.4	0.6	46	40
		leaves	00	30	50	40	2.5	1.2	0.9	1.2	45	40
2.	<i>Amaranthus tricolor</i> L.	Root	70	80	50	40	3.5	3.2	1.2	1.5	49	45
		Stem	80	80	70	50	5.6	5.2	5.2	4.8	52	48
		leaves	70	70	70	50	5.4	5.1	7.2	6.3	50	40
3.	<i>Cardiospermum helicacabum</i> L.	Root	60	70	40	40	3.5	3.4	4.0	5.1	29	20
		Stem	80	80	50	30	3.8	3.6	5.2	4.9	26	15
		leaves	80	70	40	30	4.2	4.5	4.7	4.9	35	30
4.	<i>Corchorus olitorius</i> L.	Root	80	60	50	30	2.4	2.1	2.7	1.5	50	65
		Stem	90	100	60	60	2.3	0.5	2.5	00	40	59
		leaves	80	80	30	40	4.2	00	2.7	00	50	70
5.	<i>Cyperus rotundus</i> L.	Rhizome	40	10	70	50	5.2	4.9	5.2	2.7	49	71
		leaves	10	10	90	60	8.6	0.9	7.6	0.5	58	65

6.	<i>Euphorbia heterophylla</i> L.	Root	00	00	70	60	3.2	2.8	3.3	3.5	55	50
		Stem	10	30	60	70	3.4	3.3	4.6	4.1	40	45
		leaves	00	10	50	70	2.7	2.9	3.9	2.1	40	47
7.	<i>Euphorbia hirta</i> L.	Root	30	20	70	50	4.3	3.6	2.7	1.3	80	74
		Stem	40	30	60	40	5.2	3.9	3.0	1.6	75	69
		leaves	30	20	70	50	3.7	2.9	4.1	1.2	89	72
8.	<i>Phyllanthus amarus</i> Schumach. & Thonn.	Root	10	00	40	30	2.6	2.5	3.5	3.7	45	40
		Stem	70	40	60	40	3.2	3.1	4.9	5.2	70	75
		leaves	10	10	90	80	6.7	5.3	7.5	4.6	100	90
9.	<i>Portulaca oleracea</i> L.	Root	10	00	80	80	5.8	5.5	5.9	5.7	94	87
		Stem	10	10	90	90	5.4	5.1	5.4	5.3	90	90
		leaves	50	00	70	90	5.5	3.9	6.2	6.0	93	95
10.	<i>Vicoa indica</i> (L.) DC.	Root	40	30	80	60	3.5	3.9	2.9	2.1	69	83
		Stem	30	20	50	50	2.9	1.8	3.9	1.4	57	59
		leaves	30	40	70	30	3.6	2.1	2.7	1.3	64	89
	Control	control	70	60	90	70	6.3	5.2	5.7	4.9	97	85

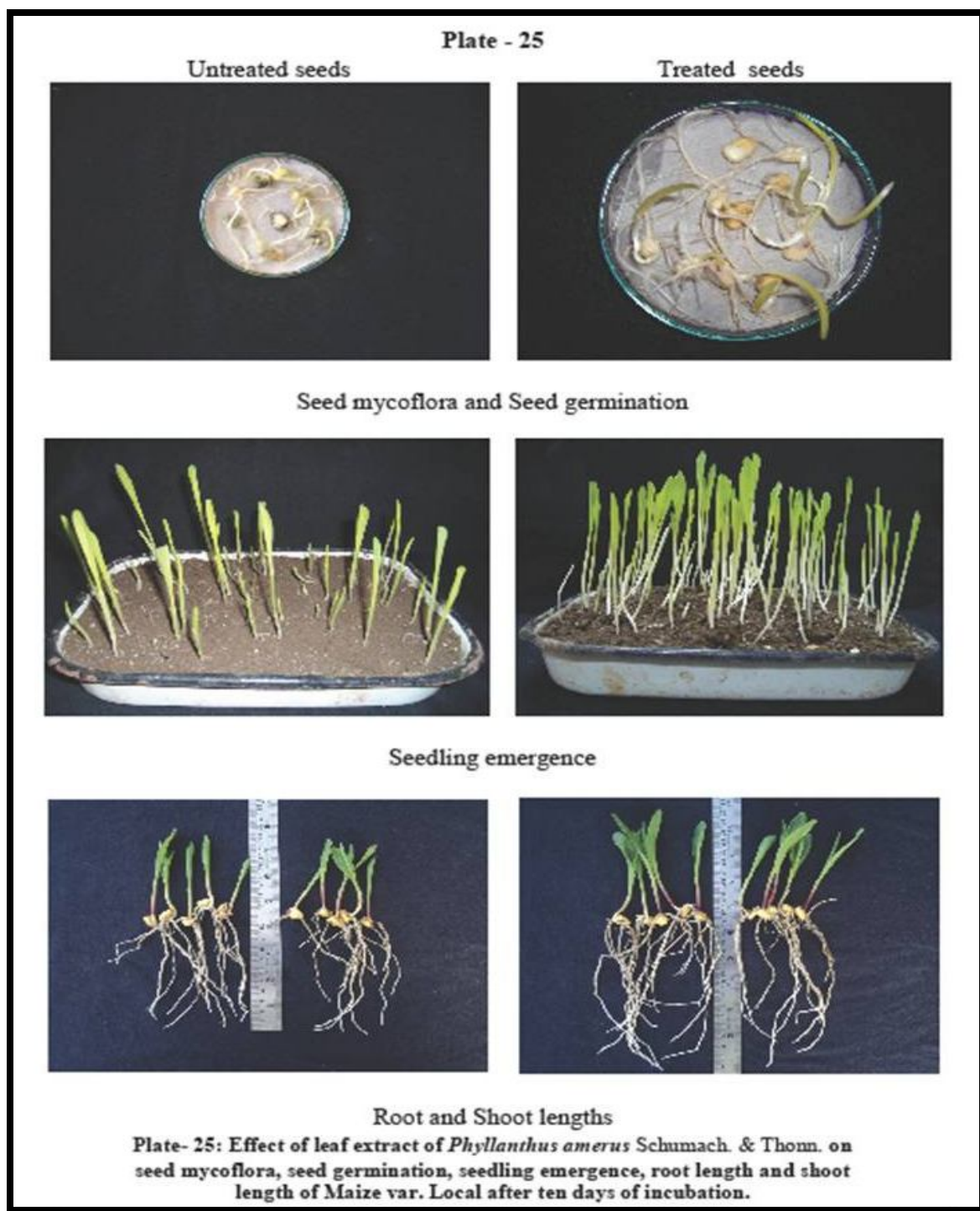
We = Water extract, Ee = Ethanol extract, SG= Seed germination, RL= Root Length, SL= shoot Length, SE= Seedling Emergence

The seeds soaked in the aqueous and ethanolic root, stem and aqueous leaf extract of *Alternanthera sessilis* (L.) R.Br,ex DC, *Euphorbia heterophylla* L. (aq. root, leaf and ethanolic root extract), *Phyllanthus amarus* Schumach. & Thonn. (ethanolic root extract) and *Portulaca oleracea* L. (ethanolic Root and leaf extract) were found in completely inhibitory for seed mycoflora on test maize seeds. The water extract of root, stem and leaf extract of *Cardiospermum helicacabum* L. showed stimulatory for seed mycoflora and inhibitory for seed germination, seedling emergence, root and shoot length as compared to other plant extracts and control. The effect of different concentrations of aqueous root extracts of the two weeds, *Panicum colonum* L., *Euphorbia thiamifolia* L. on seed germination of two pulses has been studied by Dabgar et al. in 2010. These findings are supported by congress grass on crop plants (Dhawan, 1995). The water extracts from 23 common weed and crop species inhibited germination and growth of wheat seedlings. Root exudates of wild oats (*Avena fatua*) reduced growth of wheat crops (Schumacher, et al., 1982). Shad (1985), observing the competitiveness of different weeds in maize, found that *Sorghum*

*halepense* and *Cyperus rotundus* were competitive against maize. Dharmaraj et al. (1988) reported the allelopathic effects of three different weeds *Asphodelus tenuifolius* Cavase, *Euphorbia hirta* Linn and *Fumaria indica* Haussk H.N. on the growth of maize. Similar work has been carried out by different workers such as Chung et al., (2000), Rai et al., (2002), Rathor and Kagne (2005), Deokule and Avchar (2006), Shinde et al (2010), Kuri et al., (2011), Survase, (2012).

#### CONCLUSION

The results of experimental studies proved that the aqueous leaves extract of *Phyllanthus amarus* Schumach. & Thonn. both root, stem and leaf extract of *Portulaca oleracea* L. showed much reduced incidence of seed mycoflora and more seed germination, seedling emergence, root length and shoot length of maize as compared to other plant extracts and control. It is followed by *Euphorbia hirta* L. The extract of *Cardiospermum helicacabum* L. showed adverse effect on seed health. However, more Research needed to confirm the allelopathic potential of weed species on seed germination and seedling growth of Maize in a natural environment.



**Photoplate- Effect of leaf extract of *Phyllanthus amarus* Schumach. & Thonn. on seed mycoflora, seed germination, seedling emergence, root length and shoot length of Maize var. Local after ten days of incubation.**

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