

**Original Research Article****PHYTOTOXIC EFFECT OF *SUAEDA FRUTICOSA* EXTRACTS ON GERMINATION OF *ABELMOSCHUS ESCULENTUS* (*HIBISCUS ESCULENTUS*) AND *BRASSICA OLEARACEA*.****Aziz Khan, Sultan Mehmood, Rehman ullah khan, Saad ullah khan, Inam ali shah, Adnan Khattak**

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**ABSTRACT**

The present study was carried out to record and report the phytotoxic effect of *Suaeda fruticosa* extract on germination of *Abelmoschus esculentus* and *Brassica oleracea*. *Suaeda fruticosa* is an evergreen small much branched succulent Shrub growing to 1 m; in saline soil of xeric habitat of District Bannu. This plant has inhibitory effect on germination of radicle and plumule of seed. In this study the effect of different concentration (0 mg/ml, 5mg/ml, 7mg/ml, 10mg/ml) of shade dry leaf methanol extract of *Suaeda fruticosa* on germination of *Abelmoschus esculentus* and *Brassica oleracea* were investigated. The results showed that the methanol extract of this plant gradually decreased the germination percentage, especially at higher concentration. The radicle and plumule length were also affected by different concentration. Maximum growths were occurred at control Petri dish; the growth decreased as the concentration of extract increased; growth become Minimum at higher concentration. The same results were observed in the field by apply the same amount of methanol extract of this plant. It is concluded that presence of *Suaeda fruticosa* in the field may retard the germination and seedling of *Abelmoschus esculentus* plants and *Brassica oleracea*. It was also show that no growth occurs at higher concentration.

**Keywords:** *Suaeda fruticosa*, Phytotoxic effect, Germination, *Abelmoschus esculentus*, *Brassica oleracea*.

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**INTRODUCTION:**

*Suaeda fruticosa* (L.) Forst. is an important member of Chenopodiaceae which is fairly common plant of sand dunes in Southern Baluchistan and Trans-Indus plains, also found in certain area of District Bannu. *Suaeda fruticosa* plant is locally known as Thoman. In Pakistan, *Suaeda fruticosa* is the most common halophytes and ecologically most adaptable species of the genus *Suaeda*. It covers vast stretches of salty alluvial flats with clayey or sandy soils subjected to episodic water logging, on drier sites and coastal belts [1]. *Suaeda fruticosa* is an evergreen small much branched succulent Shrub growing to 1 m; stem pale, glabrous; leaf scars prominent, raised; leaves alternate, 5-15 mm by 1-3 mm, linear-oblong or ellipsoid, obtuse, fleshy, half terete, floral-leaves small, sessile; flowers minute bi-sexual, 1-3 mm in the leaf axils, forming terminal interrupted spikes, bracteates and 2-bracteolate; bracts and bracteoles 1 mm long, membranous; perianth less than 3 mm long, 5-lobed, subglobose; segment equal, obtuse, incurved, concave; stamen 5; filament short, anthers large; ovary ovoid; style absent; stigmas 2-5, usually 3; utricle small, membranous, included in the

perianth. It is in flower from Jul to October, and the seeds ripen from Aug to October; pollinated by Wind, self. The plant is self-fertile [2].

Phytotoxic effect of extract from different parts of plant on germination and seedling vigor of many crops have been reported [3]. Phytotoxic effect of *Calotropis procera* extract on Germination and Seeding Vigor of wheat [4]. The extract of *Euphorbia helioscopia* L. reduced the seedling emergence, germination percentage, and seeding vigor index in chickpea, wheat and lentil crops [5]. Kayode and Ayeni (2009) showed aqueous extracts of sorghum stem and rice husks had allelopathic effects on the germination and growth of maize and the degree of inhibition depends on extract concentration [6]. Similarly the root exudates of *C.rotundus* significantly reduced the root and shoot growth of tomato and cucumber plants [7].

## MATERIAL AND METHOD

The present study was conducted during 2012-13. *Sueda fruticosa* leaves were collected from Bada Mir Abas area of District Bannu in Khyber PakhtunKhwā Pakistan. All leaves were washed with distilled water to remove dust and other residues, than the leaves were dried under shade. The dried samples were than crushed to powder form by electric Grinder. After that, leaf powder were soaked in 70% methanol 1:10 (w/v) for 72 hours at room temperature. The methanol extract was collected by use of Whatman filter No. [8]. Methanol and water was evaporated while extract was obtained. After extraction, stock solution of 5g/50ml or 10mg/1ml was prepared, further dilute concentration of stock solution are (0mg/1ml, 5mg/1ml, 7mg/1ml, 10mg/1ml) were prepared, distilled water as the control treatment. Seed of *Abelmoschus esculentus* and *Brassica oleracea* were selected for this research. There are four replication; in each replica there were three Petri dish. Three Petri dishes were selected for each concentration; 15ml of each concentration were prepared. Added 5ml extract concentration to each Petri dish of replica. After drying blotter paper 7 seeds were grown in each petridish. Three petridish of 0mg/1ml was taken as a positive control of all these treatments. *Abelmoschus esculentus* and *Brassica oleracea* were selected for this study. Statistical analysis of data was carried out by using SPSS and Excel soft ware. Comparison of mean was carried out by with the Duncan's multiple tests using SPSS [8].

## RESULT AND DISCUSSION

### Percentage of Germination

Mean comparison showed that there was a significant different among control with, 7mg/1ml and 10mg/1ml in *Abelmoschus esculentus* (*Hibiscus esculentus*) and *Brassica oleracea* but 10mg/1ml showed significant different with control and 5mg/1ml ( $P < 50$ ). There was no significant difference between 5mg/1ml and 7mg/1ml. The results showed that leaf extract of *Sueda fruticosa* reduced germination percentage in *Abelmoschus esculentus* and *Brassica oleracea* plants. In seed germination of *Brassica oleracea* significant difference were not found between 7mg/1ml, and 10mg/1ml but significant different were found among control, 5mg/1ml and 7mg/1ml in *Abelmoschus esculentus* but significant different were found in the same amount of treatment in *Brassica oleracea*. In treatment of 10mg/1ml, germination percentage of seeds of *Abelmoschus esculentus* were 31.33%, while germination percentage of 7mg/1ml, 5mg/1ml and control were 41.77 %, 65.27%, 100% ,respectively similarly the germination percentage of *Abelmoschus esculentus* seeds at control were 100% while germination of) *Brassica oleracea* treatments at concentration of control, 5mg/1ml, 7mg/1ml and 10mg/1ml were, 100% 45.51%, % , 9.07% and 0%. There fore, the greatest and least

inhibitory effect of leaf extract on percentage of seed germination was belonged to *Brassica oleracea* and *Abelmoschus esculentus* plant seeds. Effect of different concentration level of plant extract on *Abelmoschus esculentus* and *Brassica oleracea* seed germination were shown in Table.1 and 2

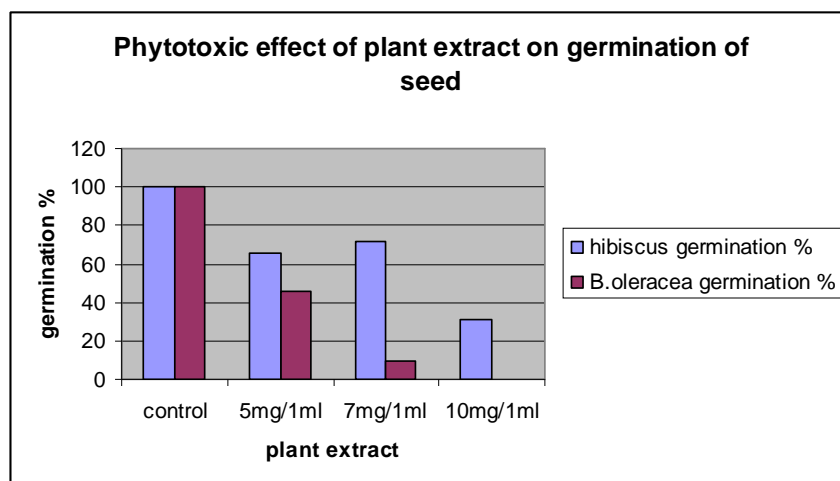


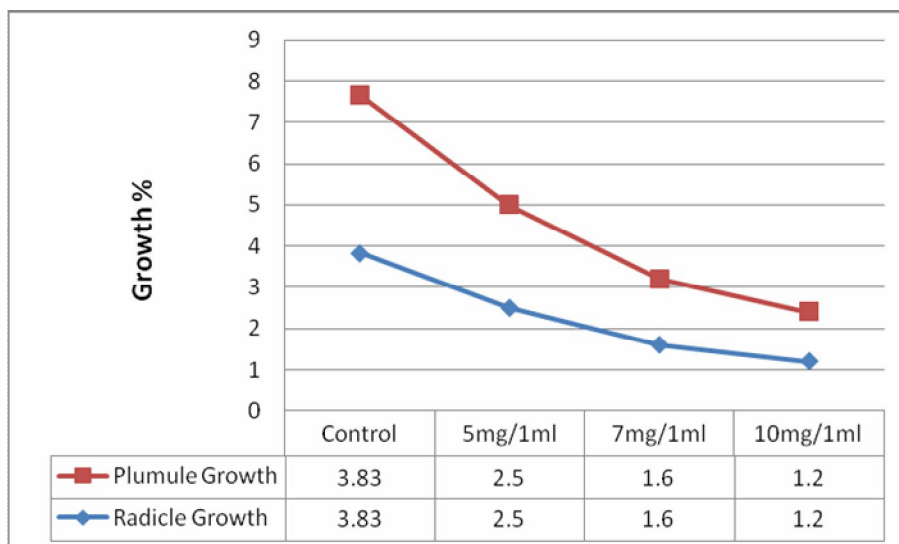
Fig 1 Graphic Representation of Plant Extract on germination of Seed.

Table1: Radicle and Plumule Growth of *Abelmoschus esculentus* plant treated by various Concentration of *Sueda fruticosa* Extract.

	Radicle Growth	Plumule Growth
<b>Control</b>	2.5cm	2.5cm
	4.2cm	4.1cm
	4.8	4.9cm
<b>Mean</b>	<b>3.83cm</b>	<b>3.83cm</b>
<b>5mg/1ml</b>	1.5cm	1.5cm
	2.5cm	2.9cm
	3.5	3.1cm
<b>Mean</b>	<b>2.5cm</b>	<b>2.5cm</b>
<b>7mg/1ml</b>	.8cm	.6cm
	1.5	1.7cm
	2.3cm	2.3cm
<b>Mean</b>	<b>1.6cm</b>	<b>1.6cm</b>
<b>10mg/1ml</b>	.6cm	.6cm
	1cm	1cm
	2cm	2cm
<b>Mean</b>	<b>1.2</b>	<b>1.2</b>

### Growth of Radicle and Plumule

The result showed that the differences among treatment were significant in *Abelmoschus esculentus* plant but in *Brassica oleracea* plant there were more significant difference were observed, highest and minimum length of radicle and plumule observe in control and more concentrated extract treated seeds which were shown in (Table 1 and table 2).



**Fig: 2 Phytotoxic Effect of *Sueda fruticosa* Extracts On Germination Of *Abelmoschus esculentus* (*Hibiscus esculentus*.)**

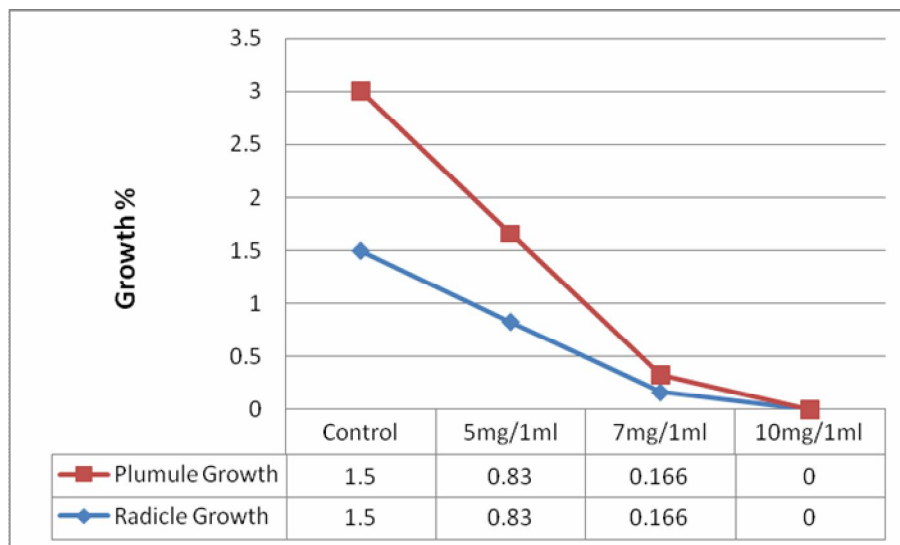
**Table 2: Radicle and Plumule Growth *Brassica oleracea* plant Treated by various Concentration of *Sueda fruticosa* Extract**

	Radicle Growth	Plumule Growth
Control	1cm	1cm
	1.5cm	1.5cm
	3cm	3cm
<b>Mean</b>	<b>1.5cm</b>	<b>1.5cm</b>
5mg/1ml	.5cm	.2cm
	.9cm	1cm
	1.1cm	1.3cm
<b>Mean</b>	<b>.83cm</b>	<b>.83cm</b>
7mg/1ml	0cm	0cm
	0cm	0cm
	.5cm	.5cm
<b>Mean</b>	<b>.166cm</b>	<b>.166cm</b>
10mg/1ml	0cm	0cm
	0cm	0cm
	0cm	0cm
<b>Mean</b>	<b>0cm</b>	<b>0cm</b>

### Growth of Radicle

With increasing of extract concentration, inhibitory effects of extracts on radicle growth increase, therefore highest reduction in radicle length observed in treatment of 10mg/1ml. In *Abelmoschus esculentus* the differences in radicle growth between Control and 5mg/1ml was not significant similarly the difference between 5mg/1ml and 7mg/1ml was also not significant, but there was significant difference among control with 7mg and 10mg/1ml ( $p < 0.05$ ) similarly the different between control and 10mg/ is also significant but there was no significant difference between 5mg/1ml and other treatments although growth of radicle,

decrease. In *Brassica oleracea* the difference in radicle growth between control and other concentration, i.e. 5mg/1ml, 7mg, 10mg/1ml was significant. ( $p < 0.05$ ), similarly the significant difference were also found among concentration of 5mg/1ml and 10mg/1ml; in case of *Brassica oleracea* more significance difference were observed.



**Fig: 3 Phytotoxic Effect of *Sueda fruticosa* Extracts On Germination of *Brassica oleracea*.**

### Growth of plumule

Application of leaf extract of *Sueda fruticosa* reduced plumule length in *Abelmoschus esculentus* and *Brassica oleracea* (table 1 and Table 2). In all plants, the highest reduction in plumule length observed in 10mg/1ml treatment. In *Abelmoschus esculentus* there was no significant difference were found in between control and 5mg/1ml treatment but the different among control, 7mg/1ml and 10mg/1ml were significant ( $p < 0.05$ ) Treatment 5mg/1ml reduce growth but not significant but in *Brassica oleracea* there was a significant difference between control and other concentration treatment but significant difference were also observe in 5mg/1ml and 10mg/1ml. The result showed that 70% methanol extract of dried leaves had inhibitory effect on seed germination and growth of seedling of *Abelmoschus esculentus* (*Hibiscus esculentus*) and *Brassica oleracea*. The present result were similar as reported by Al.Zahrani [8] and S.Ghasem [9].

In the studied plant, the greatest inhibitory effect was found in highest concentration of (10mg/1ml). In case of *Brassica oleracea*, the inhibitory effect increase when concentration of extract increase; at 10mg/1ml the growth become cease. Similar phytotoxic effect of many plant extract have been reported. Extract of different parts of this plant affect germination and seedling vigor of many crops [10]. Channappagoudar [11] reported that the extracts of *Cyperus rotundus* and *Commelina bengalensis* had an inhibitory effect on germination and seedling length of wheat, green gram and soybean.

It was showed that the water extract of *Euphorbia helioscopia* L. reduced the germination percentage, seedling emergence and seeding vigor index in wheat, chickpea and lentil crops. Regarding treatment and treatment mode (TxM) interaction, the lowest germination percentage (7.0%) was found with the *Calotropis procera* extract applied to soil which remains significantly at par with that observed in Petri plate where *Calotropis procera* extract

applied to sand. The highest germination percentage (60%) was found in Petri plate in which seed soaked with *C.procera* extract. [5].

## CONCLUSION

In general, it was concluded that extract of *Suaeda fruticosa* inhibit the germination and seedling growth of *Abelmoschus esculentus* and *Brassica oleracea*, due to its phytotoxic effect but the phytotoxic effect of *Suaeda fruticosa* on *Brassica oleracea* is more than *Abelmoschus esculentus* which was also significant although *Sueda fruticosa* inhibit growth of radicle and plumule in both plants

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## REFERENCES

1. Grigore M.N and Constantin T, 2007. Histo-Anatomical Strategies Of Chenopodiacea, Halophytes: Adaptive, Ecological and Evolutionary implications.Journal of Wseas Transactions on Biology and Biomedicine.Issue 12, Volume 4, 2007.
2. Britannica Online Encyclopedia". Rose (plant) - Britannica.com. 2007-11-19. retrieved 2009-12-07.
3. Oudhia, P. and Tripathi, R.S.2001.Allelopathic effects of *Ageratum conyzoides* and *Calotropis gigantean* on germination and seedling vigour of rice. Agric.Sci.Digest.21(1): 69-70.
4. Yasin, M., E.Safdar, and Z.Iqbal (2012). The Phytotoxic Effect of *Calotropis procera* Extraction on Germination And Seeding Vigor of Wheat.Pak.J.Weed Science. Res.18(3): 379-392, 2012.
5. Tanveer, A., A. Rehman, M.M. Javaid, R.N.Abbas, M. Sitan, A. U. H. Ahmad, M.S. Ibin-i-zamir, K.M Chaudhary and A. Aziz. 2010. Allelopathic potential of *Euphorbia helioscopia* L. against wheat(*Triticum aestivum*L.), chickpea (*Cicer arietinum* L.) and lentil (*Lens culinaris* Medic.). Turk. J. Agric.For, 34: 75-81.\
6. Kayode,J. and Aayeni,J.M.2009.Allelopathic effect of some crop residues on the germination and growth of maiz(*Zea mays*L). The pacific Journal of Science and Technology.10(1); 345-349.
7. Alsaadawi. I.S. and Salih. N.M.M (2009). Allelopathic potential of *Cyperus rotundus* L., Interference with crop Allelopathy. Journal. 2009; 23(1)
8. Al-Zahrani, H. S and Al-Robai, S.2007. Allelopathic effect of *Calotropis procera* leaves extract on seed germination of some plants. JKAU: Sci. 19: 115-126.
9. Ghasemi, S.,M. Ghasemi, N.Moradi and A.M.Shamili .2011. Effect of *Calotropis procera*. Leaf Extract on Seed Germination of Some Plants. Journal of Ornamental and Horticultural plants. ISSN(Print): 2251-6433. (Online): 2251-6441.

10. Kavitha D, PrabhakaranJ and ArumugamK.2012 Phytotoxic effect of Purple nutsedge (*Cyperus rotundus*L.) on germination and growth of Finger millet(*Eleusine coracana* Gaertn.)
11. Channappagoudar BB. Jalager, BR and Biradar, N.R.(2005). Allelopathic effect of aqueous extracts of *Cyperus rotundus* and *Commelina bengalensis* on germination and seedling length of wheat, green gram and soybean.Karnatak .J.Agriculture. 2005; 18:916-920.