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Phytochemical inhibition of potential weeds on Santa Maria feverfew plant

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Abstract
In vitro experiments were conducted to assess the inhibitory potential of root leachates (in methanol and ethanol) of selected weeds on germination and seedling growth of Santa Maria Feverfew plant (*Parthenium hysterophorus* L.). Based on the field survey the potential plants were selected and leachates were prepared at 50% and 100% concentration in both methanol and ethanol solvent. The results revealed that root leachates of *C. occidentalis* in ethanol solvent at higher concentration (100%), inhibits germination and seedling growth as compared to methanol solvent and was found to be significant ($P<0.05$).

Keywords: menace, white top plant, Allelopathy, extraction

Introduction

Parthenium weed has serious implications on not only humans but also plants because of its strong competitive nature. It is allergic to humans causing skin rashes and other respiratory problems (Adkins *et al*. 2000) [1]. In India, Australia, Ethopia and China, this weed has become a serious problem in agricultural sector and suppresses the nearby vegetation by its strong allelopathic chemicals.
In nature there are many weeds growing along with *Parthenium* and exhibiting a strong competition with this obnoxious weed (Mersie and Singh, 1987) [2].

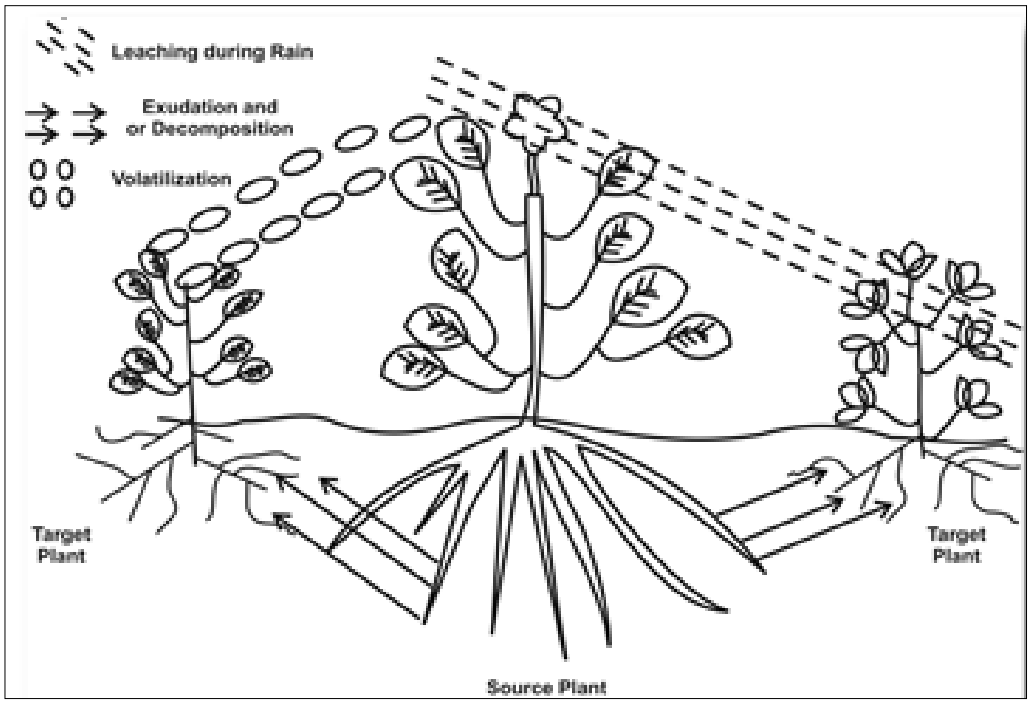

Fig 1: Various means of Leaching

Fig 2: Seedlings of Santa Maria

Chemicals with allelopathic potential are present in all plants and their tissues, including leaves, stems and roots etc. Hence, a comparative study was carried out to determine the effect of different concentrations of test weeds root leachates on seed germination, plumule and radicle length of *Parthenium*.

Materials and Methods

The fresh roots of selected weeds were collected and then soaked in 100 ml of both methanol and ethanol solvents each under aseptic conditions for 20 days and placed in conical flask under refrigeration. Then viable seeds of *Parthenium* were divided into 5 replicates of 10 seeds each and were placed on filter paper in sterilized dishes, moistened with distilled water. Thereafter, 5 ml of methanol and ethanol root leachates of different concentrations were used for further moistening and treatment. After 15 days the number of germinated seeds, growth of epicotyls plumule length and hypocotyls radical length was also recorded.

Results and Discussion

It has been observed from the Table-1. that maximum inhibition in germination percentage was by *Cassia occidentalis* in ethanol root leachates at 100% (20.0±1.5) followed by methanol at 100% concentration (30.0±0.5) and was found to be significant. *Croton bonplandianum* ethanol leachates at 100% were found to be significant over methanol, followed by *Calotropis procera*. Maximum germination was recorded in control that is 80±0.0. In the comparative study of methanol and ethanol root leachates in plumule and radical length of *Parthenium* it has been observed that maximum inhibition is in ethanol leachates at 100% concentration followed by methanol. The order of severity is *Cassia occidentalis*> *Croton bonplandianum*> *Calotropis procera* and was found to be significant. As per Singh and Thapar (2004), seed germination and seedling growth were significantly inhibited in the order: Leaf > stem> root. According to Oudhia and Tripathi (2004) [4], extracts of different plant parts viz. root, stem and leaf of *C. procera* affect germination and seedling vigor of many agricultural crops. However, extracts of *C. procera* failed to produce any detrimental effects on weeds such as *Chenopodium album*, *Melilotus alba* and other experimental weeds. A nearly similar finding in aqueous extracts of *C. gigantea* was observed by Oudhia and Tripathi, (2001) [3]. In a study conducted by Patil (1994) the seed germination of the test weeds was affected by the extracts of *C. procera* leaves.

Conclusion

It can be concluded that *C. occidentalis* suppresses *Parthenium* weed in its natural habitats as it contains the strong allelochemicals compounds that enable the plant to compete with White top plant that is *Parthenium hysterophorus* L.

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Table 1: Effect of solvents root leachates of competitive plants on growth of Santa Maria Feverfew plant

Competitive Plants	Concentration (%)	Germination (%)		Methanol root leachates		Ethanol root leachates	
C. occidentalis		**Methanol**	**Ethanol**	**Epicotyl plumule length**	**Hypocotyl radicle length**	**Epicotyl plumule length**	**Hypocotyl radicle length**
	50	50.0±(2.3)	42.50±(1.8)	6.15±(3)	5.15±(1.5)	4.75±(1.5)	4±(0.5)
	100	30.0±(0.5)	20.0±(1.5)	5.75±(1.5)	4.95±(2.3)	4.5±(2)	3.9±(1.5)
C. procera	50	80.0±(0.5)	75.15±(2.3)	10.15±(1.2)	9.98±(1.3)	9±(0.2)	8.9±(1.5)
	100	62.50±(1.5)	59.10±(2)	9.25±(2)	9.15±(1.3)	8.95±(0.2)	8.25±(0.5)
C. bonplandianum	50	70.0±(1.5)	62.0±(1.8)	8±(2)	7.9±(2)	5.98±(0.5)	5±(1.2)
	100	58.0±(2.3)	54.00.±(0.5)	7.55±(0.5)	7±(0.5)	5.75±(2)	5±(1.5)
Control	-	80±(0.0)	80±(0.0)	13.14±(1.3)	10±(0.2)	12.35±(2)	10.75±(1.5)

References

1. Adkins SW, Navie SC, Mcfadyen RE, Tomley A, Dhileepan K, Chamberlain J. *Parthenium* weed: the recent research effort. In: *Proceedings of the 6th Queensland Weed Symposium* (Caloundra, Qld, Australia, 10-13 July, 2000). The Weed Society of Queensland, Brisbane, Qld, Australia, 2000, 130-135.
2. Mersie W, Singh M. Allelopathic effect of *Parthenium* (*Parthenium hysterophorus* L.) extract and residue on some agronomic crops and weeds. Jour. Of Chem. Eco.,1987:13(7):1739-1747.
3. Oudhia P, Tripathi RS. Allelopathic effects of *Ageratum conyzoides* and *Calotropis procera* on seed germination and seedling vigour of rice, Agriculture Science Digest,2001:21(1):69-70.
4. Oudhia P, Tripathi RS. Allelopathic effects of white top (*Parthenium hysterophorus* L.) on chick pea. Legume research,2004:20(2):117-120.
5. Patil BP. Effects of Glyricidia maculate L. extracts on field crops, Allelopathy Journal, 1, 1994, 18 – 120.
6. Singh NB, Thapar R. WM 17-Allelopathic potential of *Ocimum americanum* on seed germination and seedling growth of *Parthenium hysterophorus* L. Abstracts IVth International Conference of Allelopathy in Sustainable Terrestrial and Aquatic Ecosystems. Haryana Agri. University, Hisar,2004:21:23-25.