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Short Communication

Allelopathic Effect of *Amaranthus spinosus* L. and *Ageratum conyzoids* L. Weed Extracts on the Seed Germination and Seedling Growth of *Cicer arietinum* L.

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***Key words*:** *Amaranthus spinosus* L., *Ageratum conyzoids* L., Aqueous extract, Seed germination, *Cicer arietinum* L.

Allelopathy is the direct or indirect effect of plants with one another through producing chemical compounds [1]. Allelopathic compounds generally occur in natural plant communities and are suggested to be one mechanism by which weeds interfere with crop growth [2]. Several weed species are reported to have allelochemicals that affect germination and growth of crops due to toxicity [3]. A family of about 65 genera and 900 species, Amaranthaceae are mostly distributed in tropical but also in temperate regions. About 18 genera and over 50 species have been reported from India [4]. *Amaranthus spinosus* L. grows annually as an erect, monoecious herb up to 100- 300cm tall, much branched. Leaves are alternate, simple, petiolate, base tapering, margins entire, apex acute or obtuse or retuse or emarginated, Blade glabrous [5]. *Amaranthus spinosus* L. is also been used as a medicinal herb [6]. Presence of phenols, ketones, flavonoids in the leaf leachate of *A. spinosus* suggest that the plant has allelopathic potentiality which might be responsible for the restricted growth activity of the crops [7].

Chick pea is an important source of cheap protein with high energy and nutritive value. Chick pea is the 3rd most important pulse crop [8]. Chick pea seeds contain malic and oxalic acids which lower blood cholesterol levels [9] chemicals with allelopathic potential are present in a variety of plant tissues [10]. Allelopathy effects specific plant processes such as cell division and elongation, action of inherent growth regulators, mineral uptake, photosynthesis, respiration, stomatal opening, and protein synthesis and membrane permeability [11-12]. The aim of the present study was to analyse the effect of the extract of *Amaranthus spinosus* and *Ageratum conyzoids* leaves on germination and growth as well as on the defence enzymes of Chick pea. The bioassays were carried out to study the effect on chick pea leaves and compared with control.

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Collection of plant material

From the Agriculture Field of Chickpea (Shirala; Sangli), Fresh leaves of *Ageratum conyzoids* and *Amaranthus spinosus* were collected. Plants were dried into shade for 7 to 8 days. The leaves of weed species were crushed into powder form with the help of grinder. Then it was pulverized and sieved to get powder. The powder stored into polythene bag, to prevent from moisture and contamination and stored in room temperature in laboratory with proper labelling.

Preparation of weed extract

50 gm leaf powder from each bag was soaked in 50 ml distilled water separately for 24 hours to obtain 100% concentration solution (W/V) [13]. The extracts were filtered through double layered muslin cloth and supernatant used as aqueous extract. The extracts were diluted by adding distilled water for making various concentrations used in this experiment.

Experimental treatments

Three different concentrations of weeds that is, 5, 10 and 15% with distilled water (DW) were taken to observe allelopathic effects of weed species on *Cicer arietinum*.

Experimental procedure

The germination of chickpea seeds was studied by Petri dish method. Ten seeds of were placed in Petri dish lined with double layer of filter paper and treated with weed extracts in three concentrations. These Petri dishes were then kept for 7 days respectively, at room temperature (°C) and kept constantly moist with distilled water. After that seed germination and seedling growth were determined for different treatments. Germination percentage was calculated as:

$$\text{Germination (\%)} = \frac{\text{Number of germinated seeds}}{\text{Total number of seed tested}} \times 100$$

Data analysis

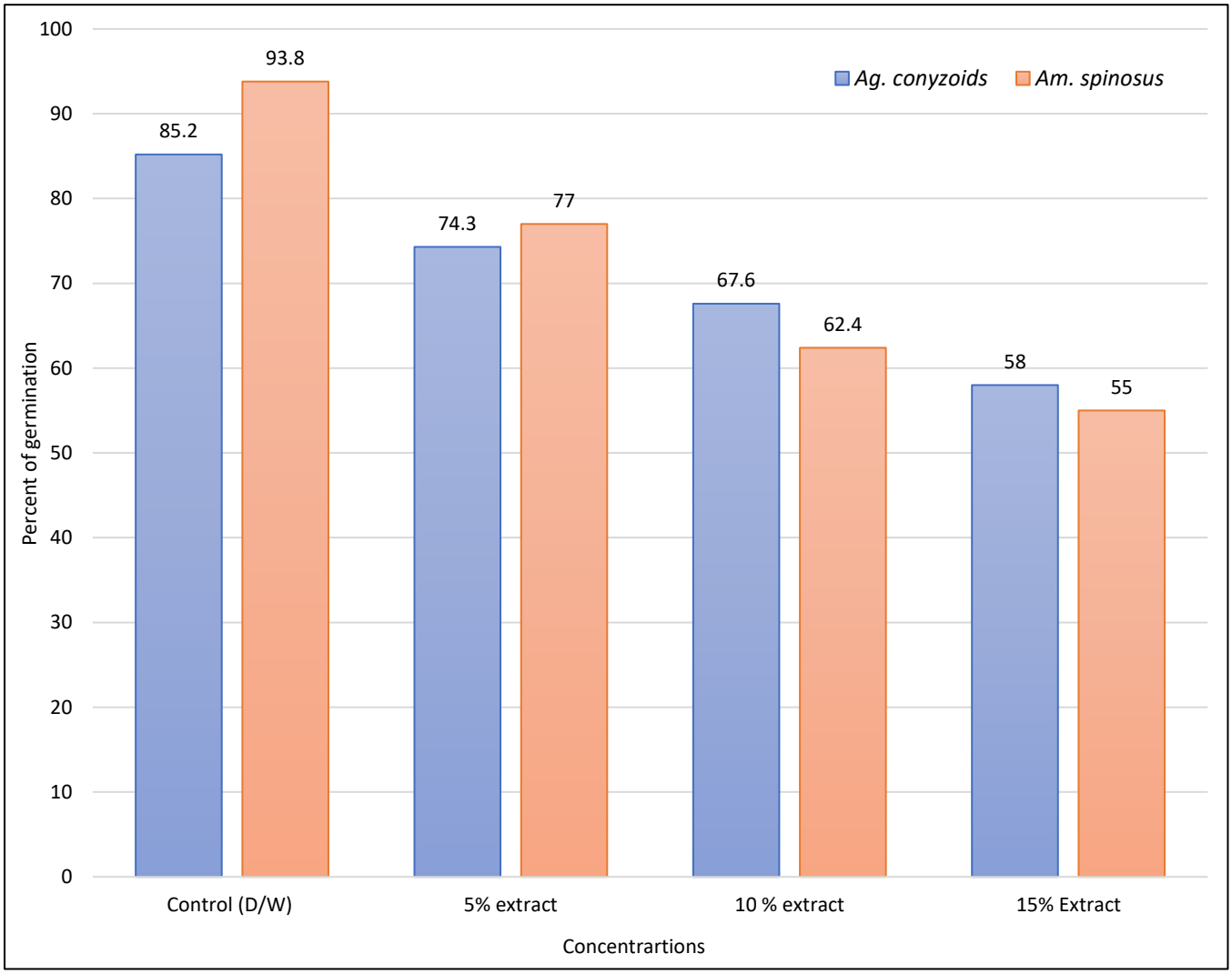
The data were subjected to one-way analysis of variance, and treatment means were compared

Ageratum conyzoides leaf extract also showed inhibitory effect on the germination and growth of the test crop plant seeds (i.e., Chickpea). According to Rao [14], *A. conyzoides* aqueous leaf extract showed inhibitory and stimulatory influence on seed germination in different varieties of Chick pea. Keeping the above in view, it is suggested that these plants should not be allowed to grow in the immediate vicinity of the agricultural fields i.e., Chickpea and other crop grown areas and this should not be used as green manure either. The present investigation showed that the aqueous leaf extract of *A. spinosus* seriously affected crop species with concentrations 5, 10, and 15%. From the present study it is evident that aqueous leaf extract of *A. spinosus* growing in and around agricultural fields contain a large number of phytochemicals, which may be responsible for the inhibitory growth activities of crop species.

These recordings showed that there is a negative impact of leaf powder on *Cicer arietinum* L. plant in various treatments. This negative impact is due to the various phenolic compounds which interfere the normal functioning of various metabolic activities and these finding lines the previous experiments in which it was proved that leaf powder of *Ageratum conyzoides* and *Amarathus spinosushas* inhibitory impact on various pulse crops.

Table 1 Effect of leaf extract on seed germination of chick pea

Treatments	*Ag. conyzoids*	*Am. spinosus*
Control (D/W)	85.2	93.8
5% extract	74.3	77
10 % extract	67.6	62.4
15% Extract	58	55



SUMMARY

The present study was undertaken to assess the allelopathic effect of *Amaranthus spinosus* L. and *Ageratum conyzoids* L. in relation to the germination and primary growth of *Cicer arietinum* (Chick pea). Effects of distilled water soluble (DW) fractions of *A. spinosus* L. and *A. conizoids* L. leaf extracts reduced germination and suppressed early seedling growth of *Cicer arietinum*. With increase in extract concentration from 1 to 100 mg/mL, a gradual decrease in seed germination and seedling length occurred. The growth of *C. arietinum* seedling was recorded in DW fraction of *A. spinosus* L. leaf extract at 1 mg/mL concentration with 94% germination. The growth of *C. arietinum* seedling was recorded in DW fraction of *A. conizoids leaf* extract at 1 mg/mL concentration with 85% germination the results suggested that these weeds had good allelopathic potential which reduces germination and plant growth.

Plate 1

Plate 2

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