

Allelopathic effects of weeds on germination and initial growth

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ABSTRACT: Recently weed scientist are more interested in weed management by allelopathy . In order to determination of Allelopathic effects of *Carthamus oxyacantha* and *Chenopodium mural* extract on the *Phasaeolous vulgaris* grains germination, during 2011-2012, one experiment in the completely randomized blocks design with 4 repetition carried out in the laboratory of agricultural collage of Azad university in the shoushtar city. The test treatments were included different rates of Various parts extract of *Carthamus oxyacantha* and *Chenopodium mural* consist of organ, root, and combining both of them, as well as, densities 0, 25, 50, 75 and 100 percent. Experimental units were Petri dishes in depth and diameter 3 and 9 Cm, respectively. The germination and its rate, rootlet length, dry weight of *Phasaeolous vulgaris* plant let evaluated according to ISTA (International seed Testing Association). The results indicated that extract of *Carthamus oxyacantha* and *Chenopodium mural* to have significant and various allelopathic effects upon *Phasaeolous vulgaris* grains germination. But germination characteristic, length and dry weight of radical (rootlet) were decreased for the reason build up extract density. A *Phasaeolous vulgaris* plant, showed that it has more sensitivity to *Carthamus oxyacantha* extract, particularly that root. The most allelopathic effects is related to extract of *Carthamus oxyacantha* root and *Chenopodium mural* aerial organs.

Keywords: Germination, Allelopathy, *Phasaeolous vulgaris* , *Carthamus oxyacantha*, *Chenopodium mural*

INTRODUCTION

Allelochemicals are present in virtually all plant tissues, including leaves, flowers, fruits, stems, roots, rhizomes, seeds and pollen they may be released from plants into the environment by means of volatilization, leaching, root exudation, and decomposition of plant residues (Putnam and Tang, 1986). Today, in the most integrating weeds management systems, extensively, use herbicides, therefore severe dependence to them, is the cause of appearance serious risk to environment, public health also raising agricultural production expenses (Burgos et al, 1999). Allelopathy arises from the release of chemicals by one plant species that affect other species in its vicinity, usually to their detriment. Defense agents, allelochemicals or allelopathins, are largely classified as secondary plant metabolites that play an important role in allelopathic interactions or plant defense and act as important ecological mechanism (Rice 1984). The Allelochemical substances at specific situations, exudes

into environment, so that, they can be effective on the germination, root and stem growth, numbers of soil micro organisms and others plant reactions (Putnam 1988). The harmful effect of plant remains upon next planting will be created important problems to chaff cultivated, how, this way is performing in order to preservation of water and soil. Substances produced of chaff, are the cause of poisoning some plants (Bohrani 1994). At all time, agricultural plants are exposing to weeds, so as to, significant part of their yield decreased because existing weeds, annually (An, M, Praty. J and Haig, T, 1998). The *Carthamus oxyacantha* is one of problematic weeds thus its allelopathic substances can be used in the environmental herbicides. The allelopathy feature of *Carthamus oxyacantha*, has potential for stopping weed growth, so, this is a new technique and studies controlling say bean weeds by way mentioned instead of chemical control in order to deduction of environmental pollution (movahed pour.F.et al 2010, P, 468). While, extract effects of *Carthamus oxyacantha* was significant on the weed

density, height and biologic operation of soybean (movahed pour, F, et al, 2010, P, 468).

The leaf extract of wheat chaff has controllable influence on the germination and growth of corn grains (Nar Val et al 1997). The investigations pointed out that extract obtained of root and aerial organ of sun flower will be resulted in deduction of germination rate, growth, length and biomass of leaf and root corn (Belteran. Et al 1997). As well as, the studies showed that leaves and rhizomes of will sorghum to be contains allelochemical substances including phenol compounds, chlorogenic, P- and p-hydroxy Banzaldeid, existing in the *Carthamus oxyacantha* extract (kohl et al 2001). Also, other researchers suggested that extract and remains of *Chenopodium mural* h, will be decreased wet weight of wheat, lettuce, barley corn, beet root and rap (Des santos et al. 2003). Seyed sharifi et al (2007) reported that *Carthamus oxyacantha* extract has controllable influence upon germination and growth of corn planted, though it can be affected on the germination indicator. Since, often diminution of plants growth and weeds is because existing their residues, too, weeds density of these plants is abundant in the corn fields. Consequently, in this research, we tried that allelopathy effect of their aerial and underground extract will be placed and studies beside grains *Phasaeolous vulgaris*. *Carthamus oxyacantha* and *Chenopodium mural* are common weeds at *Phasaeolous vulgaris* cultivated fields in the Khuzestan province.

MATERIALS AND METHODS

This test performed in the agricultural collage laboratory of Islamic Azad university of Shoushtar unit. In order to supply *Carthamus oxyacantha* and *Chenopodium mural* extract, we collected them in the harvest time then separated their aerial and underground organs and compound them with equal rate, in the next process; they dried at temperature 75°C. For provision extract, first, different parts of every plant has milled into smaller particles, then 100 ml of condensation water, was added to 5 gr plant remains and 24 hours put them in mixer at speed 200 round/min at environment temperature. Weeds extract, centrifuged by 4 layers of watman filter paper n1, during 30 minutes at speed 300 round/min, then placed them in the refrigerator (chung et al 2001). To provide densities 0, 25, 50, 75, 100 percent, weeds extract to be voluminous by condensation water. Grains *Phasaeolous vulgaris* type, s, c7, 4 is used as plant indicator, as well as, completely random design with 4 repetition and 33 treatments. Experimental treatments were consisting of *Carthamus oxyacantha* and *Chenopodium mural* extract (aerial organ, underground organ and mixture of both) and densities 0, 25, 50, 75, 100 percent of their extract. The test units were Petri Dish in diameter 9cm and depth 3cm. for prevention of growth and activity of variant microbes, both of seeds and dishes has been disinfected, then, on 2

layers, put 10 grains 15 ml extract to every ones. Petri dishes, day and night, placed in the growth room completely darkness at temperature 25 °C. In order to neutralize evaporation and changing upon various extract, should firmly to be fixed caps of Petri dishes. Airing and counting sprouts accomplished according to ISTA guidelines, daily. Ultimate counting germination rate, length, dry weight of rootlet and stem let of *Phasaeolous vulgaris* grains, also carried out in the basis of ISTA. So, to obtain dry weight of rootlet and stem let its, first, single samples dried at temperature 60 °C in 4 hours time, finally weighted them. Statistical analyze, fulfilled using software SAS and Excel but comparison averages by LSD testing at level 5%.

RESULTS

The test results indicated that extract of *Carthamus oxyacantha* and *Chenopodium mural* weeds, is a cause decreasing germination of *Phasaeolous vulgaris* grains, furthermore, the increase of extract density became more intense this effect. The extract obtained from different parts of plants considered, too, various allelopathic effects appeared from selves. As a result, root extract and aerial organs's extract, showed lowest and highest percent, respectively. Of the plant species evaluated, shoot extracts, comprising mostly of leaves, were more effective in reducing seed germination and root and shoot length of downy brome than root extracts. Oueslati (2003), Turk et al. (2003), Tawaha and Turk (2003) made similar observations on other plant species. However some plants, such as winged bean, lab lab rongai, tepary bean, grain sorghum, and sunflower (*Carthamus tinctorius* L.), showed more phytotoxic effects in root than in shoot extracts. Differences in shoot and root extract effects may indicate the presence of different allelochemicals or concentrations of allelochemicals in roots and shoots. For example, sorgoleone, an allelochemical of sorghum, constituted more than 80% of root exudate composition (Nimbal et al., 1996; Czarnota et al., 2003) but none was found in immature and mature leaves and stems of sorghum (Yang et al., 2004).. The other side, *Chenopodium mural* extract has negative effect on the germination of wheat, lettuce, and clover (Syka 2003). As observes, germination rate of *Phasaeolous vulgaris* decreased because increasing amount of their extract density. The lowest rate of germination to be associated with level 100 percent, just so, highest that is at level 25 %. The most and lowest damage to *Phasaeolous vulgaris* grains, respectively, was, at level 100% and 25%, that proportional to falling of germination, is decreased its rate. Allelopathic ability of root and aerial organ extract of *Carthamus oxyacantha* is lower compared to other results showed that rootlet length of *Phasaeolous vulgaris* was decreased meaningful along raising extract density of these weeds. Extract's different parts of *Carthamus oxyacantha* and *Chenopodium mural* being allelopathic effects on the

rootlet length of *Phasaeolous vulgaris*. As, the most rootlet length was related to aerial organs extract but lowest from root extract. Too, others results showed that root extract of weeds mentioned has significant effect on the dry weight of rootlet lout among levels 25, 50 % exist no considerable difference. Therefore, these rates receive harmful from certain amounts for instance 25 % and adding extract will be led to more damage (lose) also decreasing dry weight of roots, in comparison with root, *Chenopodium mural* causes more damage and weight deduction in the roots. *Carthamus oxyacantha* roots secrete a hydrocoinon with prolonged chain named sorghuleon which it has poisonous effect (influence) and it will be stopped rootlet growth of several plants. In adulation, assessment influence of root and aerial organ. Extract of *Carthamus oxyacantha* upon dry weight of *Phasaeolous vulgaris* root showed, aerial organ sensitivity of *Chenopodium mural* is more than that one also belong increasing extract amounts, root dry weight will be more increased. Consequently, different parts extract of weeds, have variant influences on germination percentage of *Phasaeolous vulgaris* organs of *Carthamus oxyacantha* especially its rootlet aerial organs of *Chenopodium mural* to be having allelocemical substances and allelophaty feature, over and above it have unilateral loss on critical and sensitive process means germination of *Phasaeolous vulgaris*. In the high density of extract, germination percent because more demolition, reactions related to germination showed a more decreasing. Extract of *Carthamus oxyacantha* root than the another one, to be the most effect on the germination percent of *Phasaeolous vulgaris* for the reason of gathering allelophatic substances. So as to, the most lose influence to arise from allelophaty substances in the germination stages, *Phasaeolous vulgaris* plantlet, besides competition to water absorption light and foodstuffs, means the best time of challenging to *Chenopodium mural* and *Carthamus oxyacantha* weeds is usually per-cultivation of *Phasaeolous vulgaris* or at least in third, of first (initial) process of critical time of *Phasaeolous vulgaris* growth furthermore, can be used of *Chenopodium mural* and *Carthamus oxyacantha* extract, in order to biologic decline, others weeds. Weed extract; stem fresh weight and dry deposition of nitrogen, phosphorus, potassium, calcium and magnesium in reducing stem tomatoes. Active terpenes of weed Tuesday Oxalic acid, has been isolated and identified. According to some researchers, Oxalic acid is an effective weed extract. The results of this study show that a significant negative impact on weed shoot extract the beans are grown and given that a weed is a weed

common and important field beans, fighting weeds to prevent damage to the bean crop is required.

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