Egypt. J. Agric. Res. , 77 (3) ,1997

ALLELOPATHIC IMPACT OF ASSOCIATED WEEDS ON GROWTH AND YIELD OF SUGAR BEET

M. TAHER FAYED[1], IBRAHIM H. EL-GEDAWY[2] AND MAHA M. EL-ZENY[2]

1 Fac. of Agric., Ain Shams Univ., Egypt.

2 Sugar Crops Res. Institute., Agric. Res. Cent., Giza, Egypt.

(Manuscript received 28 July 1998)

Abstract

The alleopathic effects of common associated weeds, on germination, growth, yield and quality of sugar beet plant was detected.

Aqueous leachated of weed roots reduced markedly germination %, germination rate, plumule and radicle lengths and fresh and dry weights of sugar beet seedling. Radicle elongation was more sensitive than plumule whereas fresh and dry weights were the most sensitive traits with respect to the harmful allelopathic activity.

Plant height, number and area of sugar beet leaves of diameter, size, fresh and dry weights RGR of roots were significantly reduced by residues of decayed weed roots. Reduction was more pronounced with bermuda-grass (*Cynodon dactylon* (L) Pers.), canarygrass (*Phalaris minor Retz*) and wild beet (*Beta maritima* L.) and at the 1st assessment (105 days) than late one (180 days). Reduction by the rest of weeds can be arranged as follows: lambsquarters (*Chenopodium murale* L.), bindweed (Convolvulus arvensis L.) and dock weed (*Rumex dentatus* L.)

Juice quality (T.S.S%, sucrose % and N, P and Na concentrations) of sugar beet roots were not statistically influenced by allelochemicals liberated from decayed weed roots irrespective to the slight reduction in values of such traits under allelopathic condition.

Results confirmed the phenomenon of allelopathy and its marked sharing in weed-crop interaction. The highest dangerous weeds in weed interference trial were imposed also the strengther allelopathic impact on growth and productivity of sugar beet plant.

INTRODUCTION

The possibility that some plants may excrete something from their roots which is injurious plants crops was early suggested by De Candolle (1932). It is now established that substances exerting allelopathic effects are produced by living and dead plants to affect germination, growth and consequently yield of crop plant (Hale 1982, Pope et al 1984 and Mikulas 1984). Allelochemicals enter the environment through volatilization or root exudation and move by leaching and from decomposition of plant residues (Zimdahl 1993). Majid and Jahan (1986) found that aquatic weed extract solution of different weeds at 1% concentration was the most effective on seed germination and primary seedling vigor of sugar beet. Growth pattern of young carrot, cucumber, lettuca, maize, squash, onion, radish, sunflower and tomato plants was reduced when grown in *Cynodon dactylon* infested soil (Meissner et al 1989).

Weed allelochemicals not only decreased growth parameters of crop plant, but also reduced the yield and yield attributes of many crop s(Putnam and Weston 1986, Valliappan 1989 and Kazinczi et al 1991). The main target of this investigation was to detect the allelopathic effects of associated weeds on germination, growth parameters and yield of sugar beet.

MATERIALS AND METHODS

To pot experiments were performed in Sugar Crops Research Instituet, Giza Research Station, Agricultural Research Center in each of the two successive seasons of 1992/93 and 1993/94. Weeds under investigation included the sugar beet common associated weeds namely: wild beet (*Beta maritima*, L); dock weed (*Rumex dentatus*, L.); Lambsquarters (*Chenopodium murale* L.); tooth pick (*Ammi majus*); canarygrass (Phalaris minor Retz); bindweed (*Convolvulus arvensis* L.) and bermudagrass (*Cynodon dactylon* (L.) Pers.).

One of the two experiments was concerned with weed root leachates, whereas the other was related with the weed decayed root residues.

A. Weed Root Leachates Experiment

To detect the allelopathic effect of root leachates of selected weed species on germination and establishment of sugar beet seedling, roots of weeds were unearthed at flowering stage, cleaned, sliced to suitalbe size fragments and soaked into tap water at the rate of 10 plant roots/oe letter of tap water at room temperature for 24 hours. Root leachates of each weed was filtered (Whatman No. 1) and the filtrate used in irrigating sugar beet germination test. Ten seeds of sugar beet var. "Ras poly" were sown in plastic pots (7.5 cm in diameter and 9.0 cm in height) filled with dry sterilized sandy soil (300g. /pot). Pots were gently irrigated after sowing and then regulary at 4-day intervals with 50 ml/pot of root leachattes of each weed species for 2 weeks. The control treatment was irrigated with the same amount of tap water. The trial consisted of 8 treatments (7 weed species + control) arranged in a complete randomized design in 10 replications and placed in the green - house.

Two weeks from sowing, data were recorded on germination %, germination rate (Bartlette 1937); radicle and plumule lengths (cm/seedling), fresh and dry weight (g) of sugar beet seedling.

B. Decayed Weed Root Residues Experiment

The objective of this trial was to determine the liberation of allelochemicals from decayed weed residues in soil and their influences on growth, yield and quality of sugar beet.

Root fragments of 5 plants of the previous seven weeds except tooth pick (Ammi majus L.) were mixed in 20 kg of dry loamy soil and placed in pots (50 cm in diameter and 42 cm in height). An additional treatment with soil free of weed roots was used as a control. The seven treatments were arranged in a complete randomized design in 9 replications.

Sugar beet "Ras poly var." seeds were sown at 2.5 cm depth on 15 th November for both seasons and one plant / pot was maintained until harvest. Irrigation, weed removing and fertilization were practiced. Data recorded after 105, 132 and 180 days (at harvest) from sowing (3 pots for each) on plant height (cm); number of leaves/plant; leaf area (cm 2/plant) and length (cm); diameter (cm); size (cm3); fresh and dry weights (g) and relative growth rate (RGR) (mg/g./day) (Watson 1952) of sugar beet root. Data on root juice quality included T.S.S by hand refractometer; sucrose %. (Le Docte 1972); total N% (Pergl 1945) and K% and Na% (Brown and Lilliand 1946) were obtained.

Data of each experiment were separately subjected to the proper statistical analysis of complete randomized design (Snedecor and Cochran 1967). For comparison between means L.S.D. at 0.05% level of probability was used (Waller and Duncan 1969).

RESULTS AND DISCUSSION

1. Weed Root Leachates Experiment

1. Germination percentage and rate

Aqueous leachates of weed roots reduced markedly germination % and germination rate of sugar beet seeds (Table 1). Bermuda - grass along with wild beet were the most effective weeds in this respect, whereas lambsquarters along with dock weed were the lowest ones. Aqueous leachates of weed roots seems to be with allelopathic impact on biochemical processes of germination of sugar beet seeds.

2. Plumule and radicle lengths

Leachates of weed roots severly inhibited the growth of radicle and plumule of sugar beet seedling (Table 1). Maximum inhibition occurred with canarygrass and bermuda-grass root leachates which decreased radicle length by 34.4 and 29.0% and plumule length by 21.2 and 19.2%, respectively than the control. Stunting percentage achieved with the other weeds ranged from 23.1 to 17.2% for radicle length and from 16.2 to 9.2% for plumule length. Meaningly, radicle elongation seems to be more sensitive to the hazardous impact of allelochemicals secreted from neighbouring weed roots than plumule organ.

3. Fresh and dry weights of sugar beet seedling

Fresh and dry weights of sugar beet seedlings were obviously decreased by root leachates of all weeds under investigation (Table 1). The extent of reduction herein was governed by weed species. Bermuda-grass, wild beet and canarygrass were the most effective weeds in this respect. Reduction percentages obtained by these weeds were 44.4, 13.1 and 26.7% of the fresh weight and 68.8, 62.2 and 62.2% for dry weight, compared to the control, respectively.

Evidently, there are some allelochemicals that secreted and leached from weed roots to exert many harmful effects on germination indices of sugar beet seedling. Dry and fresh weights of sugar beet seedling were the most sensitive traits to the harmful allelopathic activity of weed root leachates. However, the inhibition impacts of such allelochemicals on germination% and germination rate and radicle as well as plumule lengths were also noticeable. These inhibitory impact my be due to the hazardous effect of weed root allelochemicals exudates on division and elongation of meristemic cells in germinated crop seeds. Results obtained by Pope et al (1984); Majid and Tahan (1986); Meissner et al (1989); Kazinczi et al (1991) and Qasem (1993) were in harmony with these findings. On the other hand, weeds under investigation different in their allelochemical potentiality on germination indices of sugar beet. Bermuda-grass, canarygrass and wild beet seem to be the most effective weeds in this respect. Contrarily, lambsquarters and dock weed were the least effective, whereas tooth pick and bindweed were in-between. Differences between

Table 1. Germination sensitivity of sugar beet to the allelopathic effect of root leachates of common associated weed species after 2 weeks from sugar beet sowing (combined analysis of 1992/93 and 1993/94 experiments).

Weed species	Germination %	Germina-tion rate	Plumule length (cm)	Radicle length (cm)	Fresh weight of seedling (g)	Dry weight of seedling (g)
Wild beet	64.00	0.379	5.450	1.500	0.031	0.006
Lambsquarters	73.50	0.469	5.900	1.580	0.037	0.009
Dock weed	66.50	0.465	5.865	1.615	0.038	0.009
Tooth pick	65.50	0.420	5.550	1.550	0.035	0.008
Canarygrass	65.00	0.421	5.125	1.280	0.033	0.006
Bindweed	65.50	0.435	5.800	1.585	0.035	0.007
Bermudagrass	63.5	0.395	5.250	1.385	0.025	0.005
Weed free (control)	95.50	0.540	6.500	1.950	0.045	0.016
L.S.D. at 5% level	--	0.016	0.161	0.172	0.002	0.001

weeds in kind of allelochemicals and concentration are mainly attributed to this phenomena. Similar trend was achieved by Pope et al (1984), Majid and Jahan (1986) and Seetha et al (1990).

B. Decayed Weed Root Residues Experiment

1. On vegetative growth characteristics of sugar beet plant

Plant height, number of leaves/plant and leaf areas of sugar beet plant were severly reduced by residues of decayed weed roots (Table 2). Reductions obtained in values of such traits at the three assessment samples were more pronounced with bermuda-grass, canarygrass and wild beet. Comparing with the control, reductions achieved for the three respective weeds after 105 days were 25.5, 23.8 and 19.5% for plant height; 30.4, 25.3 and 22.7% for number of leaves and 45.4, 38.6 and 31.7% for leaf areas of sugar beet, respectively.

Table 2. Effect of decayed root residues of weeds on growth characteristics of sugar beet plant (combined analysis of 1992/93 and 1993/94 experiments).

Weed species	Plant height (cm)			Number of leaves / plant			Leaf area/plant (cm2)		
	Days after sowing			Days after sowing			Days after sowing		
	105	135	180	105	135	180	105	135	180
Wild beet	24.0	36.2	38.3	15.0	26.2	28.7	3927.0	5887.5	3866.1
Lambsquarters	26.7	37.3	42.2	16.8	27.3	36.4	4317.5	6280.4	4121.2
Dock weed	26.8	36.3	45.3	17.5	29.8	32.0	5298.7	6966.9	4873.7
Canarygrass	22.7	32.7	37.2	14.5	25.8	30.8	5332.5	5691.2	3395.1
Bindweed	26.5	37.0	43.2	17.0	29.2	38.0	49062	6868.7	4513.7
Bermuda-grass	22.2	32.2	36.5	13.5	25.2	27.3	3140.0	5495.0	2786.7
Weed free (control)	29.8	45.0	49.5	19.4	35.7	47.2	5750.1	7516.4	5239.9
L.S.D. at 5% level	3.35	4.05	6.43	2.95	6.14	11.35	164.3	275.1	324.8

Allelochemicals liberated from decayed underground parts of weeds affect division and elongation of meristermatic cells, thus inhibited height and decreased number of leaves per sugar beet plant and consequently reduced areas of total leaves per plant. Therefore, it is reviewed that the most obvious and probably the most significant consequence of alleopathy is the control and modification of population densities explaining vegetation patterns in plants communities (Muller 1969, Rice 1974, Whittaker 1970 and Meissner et al 1989).

2. On sugar beet root growth criteria

Data presented in Table (3) show that length, diameter and size of sugar beet root were significantly reduced by allelochemicals leberated from decayed weed roots. Maximum reduction was achieved by bermuuda-grass along with canarygrass and wild beet.

Table 3. Effect of decayed roots weeds on length, diameter and size of sugar beet root plant (combined analysis of 1992/93 and 1993/94 experiments).

Weed species	Root length (cm)			Root diameter (cm)			Root size (cm3)		
	Days after sowing			Days after sowing			Days after sowing		
	105	135	180	105	135	180	105	135	180
Wild beet	20.3	29.3	34.5	2.7	6.2	9.9	38.3	291.8	875.9
Lambsquarters	25.9	30.9	34.6	3.0	7.3	11.3	60.4	376.2	1144.5
Dock weed	26.3	31.3	34.9	3.4	7.9	11.6	78.8	506.0	1216.5
Canarygrass	18.2	28.8	33.8	2.6	6.1	9.1	31.9	277.6	725.1
Bindweed	26.1	31.2	34.8	3.2	7.5	11.2	69.2	454.6	1130.8
Bermuda-grass	19.5	28.3	32.5	2.4	5.9	8.5	29.1	255.2	608.3
Weed free (control)	28.6	35.0	40.3	4.5	9.7	13.2	150.0	828.7	1819.0
L.S.D. at 5% level	2.09	3.21	4.68	0.54	0.89	4.37	12.83	158.1	467.3

Fresh and dry weights of sugar beet root at the three assessments and relative growth rate (RGR) of root at the 1st estimation (105-135 days) were significantly affected by decayed weed roots (Table 4). Severity in harmful effect on such traits still sourced from decayed roots of bermuda-grass along with canarygras and wild beet. The reduction obtained with the previous weeds than the control at the 1st assessment amounted to 65.0, 63.4 and 53.4% for fresh weight; 71.3, 65.1 and 58.9% for dry weight and 42.3, 40.1 and 39.4% for RGR, respectively. Rest of weeds under investigation can be arranged in descending order with respect to their harmful impact on sugar beet root growth traits as follows: lambsquarters, bindweed and dock weed.

Allelochemicals liberated in soil from weed roots by physical secretion or exudation and by microbial decomposition seems to have inhibitory impact on division and elongation of meristemic cells in developed root and consequently diminished the extension and weight of sugar beet root. The depressing effect of decayed weed roots on growth of sugar beet root was more pronounced at the 1st assessment sample and was gradually diminished at the later ones (Tables 3 & 4). Progressive microbiological and chemical decomposition processes for allelochemical in sugar beet root ecosystem as well as their leaching and adsorption on soil colloides may have decreased the persistence of such toxins in soil with time and consequently reduced their harmful impact at the lately stges. Similar results were obtained by Patric and Koch (1958); Friedman and Horowitz (1970) and Qasem and Hill (1989).

Table 4. Effect of decayed roots of weeds on fresh and dry weights and RGR of sugar beet root (combined analysis of 1992/93 and 1993/94 experiments).

Associated weed species	Fresh weight (g)			Dry weight (g)			Relative growth rate (RGR) mg/g/day	
	Days after sowing			Days after sowing			Days after sowing	
	105	135	180	105	135	180	105-135	135-180
Wild beet	28.2	253.0	776.7	5.3	49.0	158.9	0.169	0.083
Lambsquarters	33.7	254.0	977.0	6.6	50.0	188.5	0.271	0.152
Dock weed	40.5	302.7	1186.0	7.2	54.9	243.4	0.275	0.162
Canarygrass	22.0	236.7	643.2	4.5	45.4	153.9	0.167	0.082
Bindweed	40.0	296.2	1139.0	6.9	50.2	211.8	0.273	0.159
Bermuda-grass	21.2	199.3	568.3	3.7	38.9	121.5	0.161	0.081
Weed free (control)	60.5	357.2	1320.0	12.9	68.4	286.0	0.279	0.183
L.S.D. at 5% level	11.17	47.94	173.60	3.03	14.47	32.15	0.015	N.S

3. On juice quality of sugar beet root

Data in Table (5 & 6) showed that T.S.S. % and sucrose % as well as N, P and Na concentrations of sugar beet roots were not statistically influenced by allelochemicals liberated from decayed weed roots. This trend was true for all weed species at the three samplings. However, values of these traits were slightly lower under allelopathic impact of weed species than the control. The inhibitiory effect of allelochemicals on root growth criteria (Tales 3 & 4) and their alteration on chemical properties of surrounding soil may be attributed. Qasem and Hill (1989) pointed out that Chenopodium album residues in the soil have been found to be toxic and affect the nutrient uptake process.

Results of the present study confirmed the phenomenon of allelopathy and its marked sharing in weed-crop interaction. Bermuda-grass, canarygrass and wild beet were the highest dangerous weeds in our weed interference trial (Fayed et al 1998). However, the same weeds imposed also the strengther allelopathic effect on sugar beet plant. Meaningly, allelopathy constructed a significant component in weed-crop interference bulk. In addition, allelochemicals impact of decayed weed roots was reduced at the lately stage (at harvest). Chemical and microbiological decomposition, leaching, adsorption on soil colloides and volatilization processes might deactivate some of inhibitors. Moreover, weeds are know to accumulate nutrients, but their residues may be of no advantage for the following crop plants in the presence of inhibitory materials.

More or less, weed residues may be phytotoxic and greatly reduced germination and establishment of crop seedling. This may be important in reducing the stand of the following crop plant and its ability to exploit resources earlier and could reduce their competitive abilities and consequently decline their development and productivity.

Table 5. Effect of decayed roots of weeds on sucrose % and T.S.S. % in juice of sugar beet root (combined analysis of 1992/93 and 1993/94 experiments).

Weed species	T.S.S %			Sucrose %		
	Days after sowing			Days after sowing		
	105	135	180	105	135	180
Wild beet	17.33	18.33	21.67	9.80	11.93	14.50
Lambsquarters	17.67	18.67	21.17	9.77	11.23	14.00
Dock weed	17.33	18.50	21.33	9.87	11.83	13.30
Canarygrass	17.67	19.17	21.67	10.80	12.80	14.87
Bindweed	17.67	18.33	21.50	10.93	11.23	14.30
Bermuda-grass	17.83	18.50	21.33	10.77	11.93	13.87
Weed free (control)	18.17	20.33	22.67	11.00	13.77	15.70
L.S.D. at 5% level	N.S	N.S	N.S	N.S	N.S	N.S

Table 6. Effect of decayed roots of weeds on total nitrogen, potassium and sodium percentages in sugar beet root (combined analysis of 1992/93 and 1993/94 experiments).

Weed species	Nitrogen %			Potassium %			Sodium %		
	Days after sowing			Days after sowing			Days after sowing		
	105	135	180	105	135	180	105	135	180
Wild beet	2.733	1.683	1.283	2.475	2.258	1.695	0.665	0.570	0.392
Lambsquarters	2.467	1.883	1.317	2.608	2.237	1.890	0.685	0.540	0.438
Dock weed	2.588	1.957	1.267	2.485	2.262	1.752	0.697	0.520	0.398
Canarygrass	2.783	1.883	1.250	2.473	2.207	1.780	0.655	0.558	0.395
Bindweed	2.650	1.953	1.317	2.547	2.230	1.918	0.625	0.520	0.395
Bermuda-grass	2.433	1.883	1.233	2.528	2.230	1.650	0.620	0.513	0.338
Weed free (control)	2.883	1.987	1.350	2.685	2.363	1.962	0.717	0.685	0.467
L.S.D. at 5% level	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

REFERENCES

1. Bartlette, M.S. 1937. Some examples of statistical methods of research in agriculture and applied biology. J. Roy . Soc. 4, No. 2.

2. Brown, J.D. and O. Lilliand. 1946. Rapid determination of potssium and sodium in plant meterial and soil extraction by flame photometry. Proc. Amer. Soc. Hort. Sci., 48: 341-346.

3. De Candolle, M.A.P. 1932. Physiologie Vegetale" Vol. III. Bechet Jeune, Lib. Fac. Med., Paris. In: El. Rice Allelopathy Academic Press. 1974.

4. Fayed, M.T.B, I.H. El-Geddawy and Maha M. El-Zeny. 1998. Influence of weed interference on growth, yield and quality of sugar beet. Agric. Agric. Res. Rev. (In press).

5. Friedman, T. and M. Horowitz. 1970. Phytotoxic of subterranean residues of three perennial weeds. Weed Res. 10: 382-385.

6. Hale, M. 1982. Alleopathic potential of Artemisia vulgaris rhizomes. Plant Physiol. 69 (4): 23.

7. Kazinczi, G, I. Beres; K. Hunyadi; J. Mikulas and E. Polos. 1991. Study of the allelopathic effect and competitive ability of velvetleaf (Abutilon theophrati Medic.) Novenytermeles 40 (4): 321-331. Univ. of Agric. Sci. Hungory. C.F. Weed Abst. 22, 2567, 1993.

8. Le-Docte, A. 1927. Commerical determination of sugar in the beet root using the So. Chs. Le-Doct. process., Inter. Sugar J. 29: 488-492.

9. Majid, F.Z. and M.A.A. Jahan. 1986. Study on the effects of some aquatic weed extract solutions on seed germination and primary seedling vigour of some economic crops. Bangladesh J. of Scientific and industrial Res., 21: 1-4, 119-139. C.F. Weed Abst. 34, 2522, 1988.

10. Meissner, R., P.C. Nel and E.A. Beyers. 1989. Allelopathic effect of *Cynodon dactylon* infested soil on early growth of certain crop species. Applied Plant Sci. 3 (2): 125-126.

11. Mikulas, J. 1984. Alleloathy of Sorghum halepense (L.) Pers. on weeds and crops. Acta Agronomica Academia Scientarum Hungaricae 33 (314): 423-427. C.F. Weed Abst., 35, 3200, 1986.

12. Muller, C.H. 1969. Allelopathy as a factor in ecological processes Vegetation 18: 348-357.

13. Patric, Z.A. L.W. Koch. 1958. Inhibition of respiration, germination and growth by substances arising during the decomposition of certain plant residues in the soil. Can. J. Bot. 36: 621-647.

14. Pergl, F. 1945. Quantative Organic Micro Analysis. 4th ed. J. and Churchill LTP. London.

15. Pope, D.F., A.C. Thompson and A.W. Cole. 1984. Biological activity of weed root exudates. U.S.A., South. Weed Sci. Soc. 37th ammual meeting, 320. C.F. Weed Abst. 35, 2452, 1986.

16. Putnam, A.R. and L.A. Weston. 1986. Adverse impacts of alleopathy in agricultural systems. Sci. of Allelopathy 43-56. USA. C.F Weed Abst. 33, 1043, 1988.

17. Qaserm, J.R. 1993. Allelopathic effect of nettle - leaved goosefoot (*Chenopodium murale*) on wheat and barley. Dirasat 20 (1): 90-94.

18. Oasem, J.R. and T.A. Hill. 1989. Possible role of allelopathy in the competition between tomato, *Senecio vulgaris* L. and *Chenopodium album* L. Weed Res., 29 (5): 349-356.

19. Rice, E.L. 1974. Allelopathy Academic Press, New Yourk - London.

20. Seetha, R.M., R.C. Babu; M.M. Sheriff and R.K.P. Perumal. 1990. Allelopthic potential of shoot and root leachates of certain weed species. J. of Agron. and Crop Sci. 164 (2): 81-84.

21. Snedecor, G.W. and W.G. Cochran. 1967. Statistical Methods. 6th ed. Iowa State Univ. Press, Ames, U.S.A.

22. Valliapan, K. 1989. Allelopathic effects of nutgrass, Cyperus rotundus L. in directed seeded rice. Asian - Pacific Weed Sci. Soc. No. 2, 441-445, Taiwan. C.F. Weed Abst. 15, 1653, 1992.

23. Waller, R.A. and D.B. Duncan. 1969. A bays rule for the symmetric multiple comparison problem. Amer. Stat, Assoc. J., Dec., 1485-1503.

24. Watson, D.J. 1952. The physiological basis of variation in yield. Adv. Agron. 4: 101-145.

25. Whittaker R.H. 1970. The biochemical ecology of higher plants. Pages 43-70 in E. Sondheimer and J.G. Simeone, eds. Chemical Ecology. Academic press. New York 336 pp.

27. Zimdahl, R.I. 1993. Fundamentals of Weed Science Academic Press. Inc. San Diego-Boston.

التأثير الأليلوباثى للحشائش المصاحبة على نمو ومحصول بنجر السكر

طاهر بهجت فايد[١]، إبراهيم حنفى الجداوى[٢]، مها محمد الزينى[٢]

١ قسم المحاصيل كلية الزراعة جامعة عين شمس – شبرا – مصر.

٢ معهد بحوث المحاصيل السكرية – مركز البحوث الزراعية – مصر

إستهدفت الدراسة التعرف على الاثر الأليلوباثى لجذور الحشائش المعتاد مصاحبتها لبنجر السكر على نمو ومحصول وإنتاجية وجودة بنجر السكر.

أحدثت المواد المتسربة من نقع جذور الحشائش المعتاد مصاحبتها لبنجر السكر على نمو ومحصول وإنتاجية وجودة بنجر السكر.

أحدثت المواد المتسربة من نقع جذور الحشائش تحت الدراسة فى الماء بعد أضافتها لمهد أنبات بذور بنجر السكر انخفاضا واضحا فى نسبة وسرعة أنبات البذور وطول الريشة والجذير والوزن الغض والجاف لبادرات البنجر، وكانت حساسية الجذير للتبثيط أكبر منها للريشة بينما كان الوزن الغض والجاف للبادرة أكثر الصفات تأثيرا بالنشاط الأليلوباثى.

أدت المواد الناتجة عن تحلل جذور الحشائش فى التربة إلى أنخفاض معنوى فى قيم إرتفاع النبات، عدد ومساحة أوراق النبات، الطول والقطر والحجم والوزن الغض والجاف ومعدل النمو النسبى لجذر نبات بنجر السكر. كان معدل التثبيط أعلى عند استخدام جذور كل من النجيل البلدى، الفلارس، السلق مقارنة بالحشائش الأخرى وعند القياسة الأولى (١٠٥ يوم من الزراعة) عنه عند القياسة المتأخرة (١٨٠ يوم)، وأمكن ترتيب النشاط الأليوباثى لجذور بقية الحشائش تحت الدراسة تنازليا كالآتى : الزربيج ثم العليق ثم الحميض.

لم تتأثر صفات جودة جذور بنجر السكر (٪ للمواد الصلبة الذائبة الكلية، ٪ للسكروز، تركيز عناصر النتروجين والفسفور والصوديوم) بالمواد الأليوباثيه الناتجة عن تحلل جذور أنواع الحشائش وأن قلت قيم هذه الصفات نسبيا فى وجود هذه البقايا مقارنة بعدم وجودها.

أكدت الدراسة ظاهرة التاثير الأليلوباثى لنباتات الحشائش ومساهمتها الواضحة فى أضرار الحشائش بنباتات المحصول خاصة بعد ما تبين أن اكثر أنواع الحشائش منافسة (تداخلا) مع المحصول كانت هى نفسها أيضا أكثرها فى التاثير الأليلوباثى المثبط لنمو وأنتاجية نبات بنجر السكر.