



## Allelopathic potential of 16 flax varieties against burclover (*Medicago polymorpha* L.) weed

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### 1- Abstract:

An experiment was conducted in the Laboratory of Agronomy Department, Agriculture & Biological Research Division, National Research Centre, Egypt at 2009/2010 winter season to evaluate the allelopathic potential effects of sixteen varieties of flax (*Linum usitatissimum*) against burclover (*Medicago polymorpha* L.) weed that causes great damage to flax production in Egypt. Fifty seeds of each variety individually and 50 seed of each variety plus 25 seed of burclover (together) were planted in the Petri dishes 12 cm in diameter. The germination percentage varied from 36-100% and from 4.4-100% individually and with the weed seeds, respectively. According to germination percentages, the flax varieties can be divided into resistant varieties which their percentage of germination varied from 83-100 with burclover (Sakha-1, Giza-8, Giza-9, Giza 10, Alba and Ariana) and moderate varieties which their germination percentage varied from 61-71% (Sakha-4, Mayak and Tekka) and sensitive varieties which their percentage of germination less than 50%. Also, it can be noted that some varieties have a negative effect on burclover germination such as Giza-10, Mayak, Lituania-5, Lituania-7, Tekka and Sakha-2 without affecting its own germination.

### 2- Introduction:

Allelopathy is a biological process including interactions between two plants through the production of chemical compounds (allelochemicals) that are released by leaching, volatilization, decomposition, or root exudation. Hence, allelopathy together with competition is a promising environment-friendly tool especially for weed management.

Now, the increase in interest with the development of allelopathic crop varieties for weed suppression is noticed. Allelopathic varieties are likely to be able to suppress weeds by natural exudation of bioactive allelochemicals, thereby reducing dependence upon synthetic herbicides. Many scientists have attempted to explore allelopathy directly as a weed management strategy through screening for allelopathic traits in germplasm of crops.

### 3- Materials and Methods:

This research was conducted in the Laboratory of Agronomy Department, Agriculture & Biological Research Division, National Research Centre, Egypt at 2009/2010 winter season.

Sixteen varieties of flax (*Linum usitatissimum*) (7 local, i.e., Sakha-1, Sakha-2, Sakha-3, Sakha-4, Giza-8, Giza-9, Giza 10 and nine imported from Europe i.e., Mayak, Tekka, Alba, Ariana, Letoania-5, Letoania-7, Letoania-9, Fyking and Blanka) were selected for screening out of their allelopathic potential activities against burclover (*Medicago polymorpha* L.) weed that causes great damage to flax production in Egypt.

Fifty seed of each variety individually and 50 seed of each variety plus 25 seed of burclover (together) were planted in the Petri dishes 12 cm in diameter. Seed of burclover put in the centre of Petri-dish and flax seed put surround them. Each treatment was replicated three times.

After 5 days, no. of germinated seed of flax and burclover weed were counted and germination percentage was calculated. Radical and plumule length and oven dry weight of flax and burclover were measured after 10 days. ANOVA in CRD and LSD at 5% level were used to compare means between treatments.

### 4-Results and Discussion:

The germination percentage of flax varied from 36-100% and from 4.4-100% individually and with the burclover seeds, respectively (Fig. 1). According to germination percentages, the flax varieties can be divided into resistant varieties which their percentage of germination varied from 83-100 with burclover (Sakha-1, Giza-8, Giza-9, Giza 10, Alba and Ariana) and moderate varieties which their germination percentage varied from 61-71% (Sakha-4, Mayak and Tekka) and sensitive varieties which their percentage of germination less than 50%.

Also, it can be noted that some varieties have a negative effect on burclover germination such as Giza-10, Mayak, Lituania-5, Lituania-7, Tekka and Sakha-2. Similar trend with minor different were observed in other germination traits (radical and plumule lengths and oven dry weight of flax and burclover (fig 2-4). It could be concluded that flax varieties can be cultivated to adversely affect the germination of the burclover weed without affecting its own germination. We need extensive studies to make an allelopathic map for different crop varieties maybe to use as a practical indicator for precision crop protection.

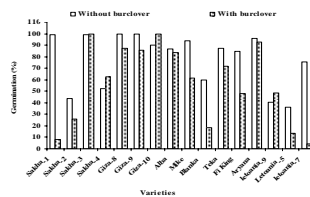


Fig 1. Germination percentage of flax varieties with and without burclover seed.

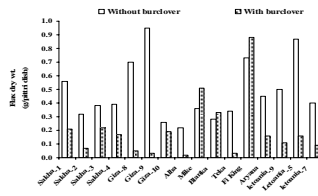


Fig 2. Dry weight (g per petri dish) of different flax varieties planted with and without burclover seed.

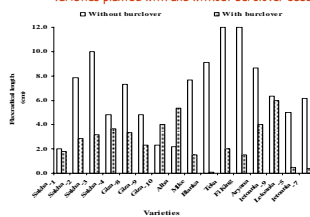


Fig 3. Radical length (cm) of different flax varieties planted with and without burclover seed.

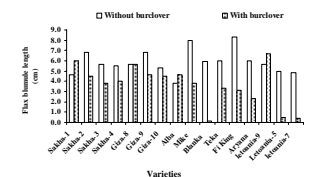


Fig 4. Plumule length (cm) of different flax varieties planted with and without burclover seed.

Table 1. Burclover germination traits germinated with different flax varieties

Varieties	Burclover germination traits			
	Germination (%)	Seeding dry wt (g/Petri dish)	Radical length (cm)	Plumule length (cm)
Sakha-1	11.11	0.052	2.93	3.73
Sakha-2	20.00	0.065	3.67	5.33
Sakha-3	10.00	0.069	1.33	1.33
Sakha-4	13.33	0.043	3.00	3.67
Giza-8	10.00	0.008	1.00	3.00
Giza-9	5.00	0.044	3.67	3.33
Giza-10	45.00	0.056	2.50	2.00
Alba	21.43	0.092	3.83	3.67
Mike	35.00	0.142	2.67	1.67
Blanka	10.00	0.037	1.00	1.00
Tekka	20.00	0.069	1.00	1.00
Fi King	20.00	0.049	1.00	1.00
Ariana	25.00	0.054	2.07	2.93
Letoania-9	20.00	0.069	2.00	3.67
Letoania-5	30.00	0.081	2.00	2.00
Letoania-7	35.00	0.106	1.00	1.00
CV (%)	8.25	9.98	14.24	38.45
LSD 5%	2.48	0.011	0.51	1.54

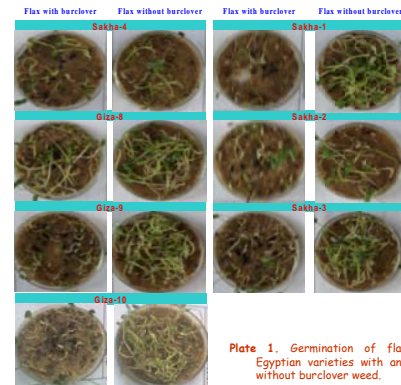


Plate 1. Germination of flax Egyptian varieties with and without burclover weed.



Plate 2. Mean values of the effect of composted sludge on some heavy metals contents in wheat grains.

### Conclusion:

It could be concluded that flax varieties can be cultivated to adversely affect the germination of the burclover weed without affecting its own germination. We need extensive studies to make an allelopathic map for different crop varieties maybe to use it as a practical indicator for precision crop protection.