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Effect of Seeds Treatment with Fungicides and Insecticides on Germination and Vigurity, Abnormal Root Producing and Protection of Cotton Seedling

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ABSTRACT- In order to evaluate the effect of insecticides, Larvin, Gaucho and fungicides Carbendazim, Carboxin- thiram and Baytan alone or mixed together, by using seed treatment on germination, vigurity, rhizogenesis and potential protecting cotton seedling, seeds treatment with different doses of insecticides and fungicides were plated in Petri dish, pot and field with natural infection to the causal agent of seedling pathogens. Percentage of germination rate, emergence percentage, and percentage of damping off, plant height, root length and number of abnormal lateral roots were measured. Analysis of variance and mean comparison using Duncan's multiple range test. The results showed that the use of 1/25 to 1/5 in 1000 of Baytan is the most suitable dose for cotton in dry regions. This dose can protect the seedling from disease agents and reducing dumping off in the field. The root length density did not decline and did not produced adventitious roots of plants. While more dose causes abnormal main root and increases abnormal secondary root and decreases the length of root. The use of these fungicides in wet areas such as Golestan province is not recommended or if it is used the dose must be 0.5 per thousand. This study showed that in cool and wet regions with planting low quality seed must avoid using it or use with low concentration less than 0.5 in thousand. In dry regions with high quality seeds or in regions where seeds emergence faster and with late planting the possibility use of these fungicides are existence. In addition Larvin insecticide and Gaucho with rate of 7 per thousand and Carboxin- thiram with rate of 4 to 6 per thousand can be used alone or in combination for cotton seed treatment for disinfection. Results also showed that Larvin insecticide and Carbendazim fungicide with rate of 7 in thousand and Carbendazim fungicide with ratio of 2 to 2/5 in a thousand can be used alone or in combination with the seed for disinfection. The recommended priority used for disinfection of seed cotton in arid regions are Gaucho and Carboxin-thiram, Larvin and Carboxin- thiram, Gaucho and Carbendazim, Carbendazim and Larvin, Baytan and Gaucho, Baytan and Larvin respectively.

Key-words- Baytan, Carboxin- thiram, Carbendazim, Gaucho, Larvin

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INTRODUCTION

Disinfected or treated seed is the seed to impregnate the material or chemicals to reduce, control or divert pests and pathogens or other organisms that may attack the seed or plant.

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Losses due to injury or damage by causal agent to seeds and plants, including reducing the number of plants in the field and indirect losses, including costs of replanting, non-uniform field products, enhancing the production costs of delayed.

During first to fourth weeks of sowing the importance of casual agents and the extent of damage in fields depends on ecological conditions, storing, technology production, seed production, selecting of seed multiplication field and harvesting time (1-3). If seedling after 2-3 weeks of planting protected, usually has enough resistant against the damaging pathogens (4). Moths, seedling fly Hylemia, bean fly rot, cut worm, agriotes, cotton thrips or onion thrips and cotton flies are pests which damage cotton seeds and

seedling. Yellow Cotton Thrips (*Trips tabaci*) as the most important pest of cotton in early season in most areas of Iran. Insecticides Larvin and Gaucho are recommended for during early season of growth for disinfecting seed against pests. Insecticides Larvin 5-7 grams per kg of seed to reduce the damage of this pest for seed disinfection is recommended. This pesticide with generic name of Thidiocarb from Carbamate groups is in form of granules or powder that dissolves in water and act as systemic contact and ingestion. Larvin is a systemic insecticide which due to its long lasting is suitable for seed treatment. Gaucho insecticides belonging to Nitrguanidine groups in form of liquid and wet powder, 5-7 grams per kg of cotton seed is recommended for seed treatment. Cotton seed and seedling are very sensitive during germination and emergence and are attacked by different pathogens (5-6). In Iran by Mansoori and Hamdullah (7) and Soleimani and colleagues (8) fungi *Alternaria alternata*, *Aspergillus niger*, *Fusarium acuminatum, Fusarium solani*, *Pythium ultimum*, *Rhizopus arrhizus*, *Rhizoctonia solani* and *Sclerotium rolfsii* as seed rot and damping-off many have been separated from cotton seeds. In Iran fungi *Alternaria alternata* (3%), *Aspergillus niger* (6%), *Fusarium accminatum* (12%), *Rhizopus arrhizus* (1%), *Rhizoctonia solani* (11%) as pathogens seed and damping off in pre emergence and *F. solani* (31%), *Sclerotium rolfsii* (11%), *Rhizoctonia solani* (46%) and *P. ultimum* (12%) as pathogens post emergence damping off have been isolated and identified. Species belonging to *Aspergillus*, *Penicillium*, *Rhizopus* and *Thrichoderma* as the main cause of damping-off not important unless the plant is weak or not in good conditions for seedling growth. In this condition, many seeds are rotted before germination and seedling mortality increases (1). For cotton seed disinfectant against fungal pathogens several fungicides are recommended. Benodanil, Captefol, Captan, Carbendazim Chloroneb, Etridiazole, Femaminosulf, Fenfuram, Fumecyclox, Hexachlorophene, Imazalil, Iprodione, Mancozeb, Metalaxyl, PCNB, Pencycuron, Thiabendazole, Thiram, Carboxin and Tolclofos-methyl fungicides are used in cotton (3). In Iran fungicides such as Captain, Carbendazim and Carboxin- thiram are component pesticides are recommended. Reduced seedling growth, delayed growth in seedling root length and increasing of fresh weight of bean seedlings was seen by Triarimol application (9), inhibition of root growth, reducing numbers of seedling branches and increase in wet and dry weight of barley was reported using Triadimefon and Triadimenol (10). The delay in first leaf elongation of winter cereals and thickness of young leaves and delay in elongation of potatoes shoots by application of Triadimenol, Propiconazole, Etaconazole and Diclobutrazole was reported. Increased root growth, amount of chlorophyll in leaf and yield increase in spring wheat by use of Triadimefon, increase in dry weight of first leaf and roots in pumpkin seedling and reduction of root dry weight using Triadimefon (11), reduction of greenhouse grown potatoes by application of Triadimefon (12) and delayed germination, reduced seedling growth of fall wheat and dark, green and small leaf of wheat have been reported by use of Triadimefon, Triadimenol and Diclobutrazole by (13). Carbendazim should not be mixed with alkaline substances and also this fungicide should not be sprayed in warm weather. Baytan fungicides in cool and wet weather conditions may cause delays seedling emergence (14). Restricting the lateral growth of main root, stimulation of secondary root production and reduction of emergence have been reported by the use of pesticides, insecticides Gaucho, Larvin and Baytan, Carbendazim and Carboxin- thiram in laboratory (15). This study examined the effects of chemical use Larvin, Gaucho, Carbendazim, Carboxin-thiram and Baytan on germination, seed emergence, rooting of plant and protection of cotton seedling**.**

MATERIALS AND METHODS

In order to evaluate the side effects of insecticides, Larvin, Gaucho and fungicides Carboxin- thiram, Carbendazim and Baytan alone and combined on growth and seed germination, emergence, plant rooting and protection of cotton seedling 10 experiments (three under Petri dish), three under flower pot and four in fields were performed with natural infestation that causes damping off were carried out in Research Department of Cotton and Fiber Crops, Agricultural and Natural Resources Research Center of Tehran, Iran, province and in Cotton Research Institute of Golestan province during 2012-2013.

1: Cotton seed of Varamin cultivar with sulfuric acid 98% was delinted and were treated by 2 g Captain, 1.5 g Benomyl, 5 g Carboxin - thiram, 1 g Baytan, 1.35 g Baytan, 1.5 g Baytan, 2.5 g Baytan 5 g Baytan and 17.5 g Baytan per kg of seed and sterile distilled water and then:

A: Treated seeds in Petri dish were kept between wet papers at 18°C with four replications in form of complete randomized design. Sprouted seeds were counted daily. Seeds were considered germinated that seedlings must be at least a centimeter long. Percentage of germination at 5, 8 and 12 days after sowing and germination rate were measured using the following formula. In this formula, M the total number of seeds, G: number of germinated seeds (or green) at a specified time and T is the counting time.

$$GV = \frac{\sum GiTi}{M}$$

B: The soil naturally infested with damping off pathogens were collected in the pot farm shed and treated seeds were sown in each pot (25 seed). Vases temperature 18 to 25°C with a completely randomized design with four replications was adjusted. Green pots and seeds were counted on daily visiting. Germination percentage at 12 days after planting and seedling mortality at 30 days after sowing and germination rate were measured.

2: Delinted seeds were treated by 7.5,15 and 25 g Larvin per kg and 5, 10 and 25 g Baytan per kg and distilled water and then:
A: Seed treated were placed in Petri dish and covered with wet paper at 18°C in form of complete randomized design (CRB) with four replications. Review and sprouted seeds were counted daily. Seeds were considered germinated that seedlings were at least a centimeter long. Percentage of germination and emergence were measured at 5, 8 and 12 days after sowing.
B: The soil naturally infested with damping off pathogens were collected in the pot and 25 treated seeds were sown in each pot. The pots were kept at temperature of 18-25°C with a complete randomized design with four replications were adjusted. Germinated seeds were counted on daily visiting. Germination percentage at 12 days after planting and seedling mortality at 30 days after sowing and germination rate were measured.

3: Delinted seeds, were treated by 7.5,15 and 25 g Larvin and 5, 10 and 25 g Baytan, and 5 g Baytan and 7.5 g Larvin, 5 g Baytan and 15 g Larvin, 10 g Baytan and 7.5 g Larvin, 10 g Baytan and 15 g Larvin, 25 g Baytan and 25 g Larvin per kg of seed and distilled water and then:
A: Seed treated were placed in Petri dish and covered with wet paper at 18°C in form of complete randomized design (CRB) with four replications. Review and sprouted seeds were counted daily. Seeds were considered germinated that seedlings were at least a centimeter long. Percentage of germination and emergence were measured at 5, 8 and 12 days after sowing.
B: The soil naturally infested with damping off pathogens were collected in the pot and 25 treated seeds were sown in each pot. The pots were kept at temperature of 18 to 25°C with a complete randomized design with four replications were adjusted. Germinated seeds were counted on daily visiting. Germination percentage at 12 days after planting and seedling mortality at 30 days after sowing and germination rate were measured.

4: Delinted seeds, were treated by 7.5 g Larvin, 15 g Larvin, 5 g Baytan, 10 g Baytan, 25 g Baytan, 5 g Baytan and 7.5 g Larvin, 5 g Baytan and 15 g Larvin, 10 g Baytan and 7.5 g Larvin, 10 g Baytan and 15 g Larvin, 25 g Baytan and 7.5 g Larvin, 25 g Baytan and 25 g Larvin per kg distilled water and then planted in farm of Research Cotton Station of Karkandeh Kordkouy with pollution of natural causes of seedlings damping off with a complete randomized design with four replications. Abnormal rate of germination and rooting of cotton plant were evaluated. 30 days after planting, the plants were removed from soil and abnormal rooting was evaluated.

5: Field experiments: Delinted seeds were treated by pesticides (g/kg):
A: 1, 1.25 and 1.5 g Baytan, 7 g Larvin, 7 g Larvin and 1g Baytan, delinted seed,7 g Larvin 1.25 g Baytan, 7 g Larvin and 1.5 g Baytan, 7 g Gaucho, 7 g Gaucho and 1 g Baytan, 7 g Gaucho and 1.25 g Baytan and 7 g Gaucho and 1.5 g Baytan per kg.
B: 4, 5 and 6 g Carboxin - thiram, delinted seed, 7 g Larvin, 7 g Larvin and 4 g Carboxin - thiram, 7 g Larvin and 5 g Carboxin – thiram, 7 g Larvin and 6 g Carboxin - thiram, 7 g Gaucho, 7 g Gaucho and 4 g Carboxin – thiram, 7 g Gaucho and 5 g Carboxin- thiram and 7 g Gaucho and 6 g Carboxin– thiram per kg.
C: 2, 2.25 and 2.5 g Carbendazim, 7 g Larvin, 7 g Larvin and 2 g Carbendazim, 7 g Larvin and 2.5 g Carbendazim, 7 g Larvin and 2.5 g Carbendazim, 7 g Gaucho, 7 g Gaucho and 2 g Carbendazim,7 g Gaucho and 2.25 g Carbendazim and 7 g Gaucho and 2.5 g Carbendazim per kg.
Each experiment was tested individually in form of randomized complete block design with four replications in the Central Station of Agriculture and Natural Resources Research Center of Tehran province. Each plot consisted of three rows planting with length of 10 meters and distances of 80 × 20 cm. Percentage of improved damping off in each treatment at 30 days after planting using the formula for Abbott was measured. Germination rate and emergence rate were calculated 15 days after sowing. Plant height, root length, number of lateral roots abnormal root in 5 randomly selected plants per plot was measured for each treatment from center plot. Analysis of variance and mean comparison using Duncan's multiple range test program was conducted by MSTATC.

RESULTS

A significant difference at 1% level on effect of germination rate was seen in Petri dish. The result of analysis of variance for effect of Baytan fungicide at 18^0C in Petri dish showed that with increasing the concentration of fungicide from 1.35 to 17.50 in thousand cotton seed, germination rate and percentage of emergence decreased. Maximum speed and percentage of germination was calculated in concentration of one in thousands of Baytan fungicide (Table 1).

Table 1: Analysis of variance of Baytan effects on germination and protection of cotton seedling

Flower pot with natural infestation			Germination in Petri dish (%)				df	Source of variation
Germination rate	Seedling mortality at 30 days (%)	Germination at 12 days (%)	Germination rate	12 days	8 days	5 days		
**28.39011	**5109.19	*2621.852	**6.69966	**2494.5	**3036.5	**3233.3	6	Treatment
0.0029	0.37551	391.7833	0.00673	2.52083	0.36036	1.17881	21	Error
1.74	1.66	34.68	3.16	2.74	1.12	2.26	-	CV

Using more than 2.5 in thousands of Baytan fungicides would cause a large decrease in speed and percentage of seed germination rate. This trend of germination speed was also observed in planted seed in pots. The percentage of germination in pots a significant difference was seen those which were treated with fungicides were in one group and seed treated with distilled water and delinted with sulfuric acid in a group. In view of dumping off percentage 30 days after planting, significant differences were observed between treatments. In this respect four groups of treatments were seen (Table 2).

Table 2: Effect of seed treatment with Baytan on germination and protection of cotton seedling

Flower pot with natural infestation			Germination rate	Germination in Petri dish (%)			Fungicide for treatment of seed (g/100kg)
Germination rate	Seedling mortality at 30 days (%)	Germination at 12 days (%)		12 days	8 days	5 days	
^{d} 4.5	^{a} 60.75	^{b} 62.6	^{b} 3.58	^{b} 75.3	^{b} 75.3	^{b} 75	distilled water
^{c} 5.11	^{b} 48.85	^{a} 70.7	^{a} 4.16	^{a} 87.1	^{a} 83.5	^{a} 82.3	100 g Baytan
^{b} 5.41	^{b} 52	^{a} 75	^{c} 3.37	^{b} 75	^{b} 75	^{c} 62.1	135 g Baytan
^{a} 5.78	^{b} 47.07	^{a} 63.3	^{c} 3.28	^{b} 73	^{c} 66.9	^{d} 58.1	150 g Baytan
^{e} 0.50	^{d} 10	^{a} 63.8	^{d} 1.5	^{c} 38	^{d} 29	^{e} 25.5	250 g Baytan
^{g} 0.40	^{d} 9	^{a} 90	^{e} 1.33	^{d} 29	^{d} 28.5	^{e} 24.8	500 g Baytan
^{f} 0.32	^{d} 9	^{a} 63.8	^{f} 0.93	^{d} 29	^{e} 17.3	^{f} 8	1750 g Baytan

Significant differences at 1% level between the concentrations of Larvin pesticides affecting the rate and percentage of germination in Petri dishes and pots were observed. Analysis of variance for Larvin concentration insecticide on germination rate at $18°^{C}$ in Petri dish showed that increasing the concentration to 17.50 in thousand seed, germination rate was decrease. Maximum speed and percentage of germination were calculated at a concentration of 5 per thousand Larvin insecticides (Table 3).

Table 3: Analysis of variance of Larvin effects on germination and protection of cotton seedling

Flower pot with natural infestation			Germination rate	Germination in Petri dish (%)			df	Source of variation
Germination rate	Seedling mortality at 30 days (%)	Germination at 12 days (%)		12 days	8 days	5 days		
**12.83478	**8320.036	**2447.149	**1.985149	**341.68	**873.1	**2298	6	Treatment
0.000374	0.03571	0.07193	0.00663	0.366071	1.949405	0.3541	21	Error
1.55	0.45	1.56	2.46	0.79	1.97	1.8	-	CV

Significant differences between treatments in the percentage of pot germination observation and treatment with 7.5 and 10 in thousand were disinfected with distilled water and delinted seed treatment with sulfuric acid and other treatments in a one group and others treatments fall in two groups. In view of dumping off percentage of plant death at 30 days after planting, significant differences were observed between treatments. In this respect treatments were three groups (Table 4).

Table 4: Effect of seed treatment with Baytan on germination and protection of cotton seedling

Flower pot with natural infestation			Germination rate	Germination in Petri dish (%)			Insecticide for treatment of seed (g/100kg)
Germination rate	Seedling mortality at 30 days (%)	Germination at 12 days (%)		12 days	8 days	5 days	
^{a} 4.5	^{b} 60	^{a} 62.4	^{c} 3.6	^{d} 75	^{c} 75	^{b} 75	distilled water
^{c} 0.61	^{a} 100	^{d} 8.36	^{c} 3.49	^{d} 75	^{c} 75	^{c} 66.7	250 g Larvin
^{d} 0	^{d} 100	24^{c}	^{e} 2.6	^{c} 79.3	^{d} 55.8	^{f} 25	375 g Larvin
^{b} 3.03	^{c} 30.25	^{b} 41.4	^{a} 3.9	^{a} 87.4	^{a} 87.1	^{a} 87.4	500 g Larvin
^{d} 0	^{d} 100	^{a} 74	^{d} 3.3	^{c} 79.8	^{c} 75	^{d} 58	750 g Larvin
^{c} 0.6	^{d} 100	^{a} 81.38	^{b} 3.8	^{b} 83	^{b} 83	^{b} 75	1000 g Larvin
^{d} 0	^{d} 100	^{d} 0	^{f} 2.16	^{e} 58.3	^{e} 46	^{f} 28.8	1750 g Larvin

A significant difference between the concentrations of fungicides and insecticides bytes and Larvin combined effected speed and percentage of germination in Petri dish compare to check pots at 1% level (Table 5).

Table 5: Analysis of variance of Larvin and Baytan effects on germination and protection of cotton seedling

Flower pot with natural infestation			Germination rate	Germination in Petri dish (%)			df	Source of variation
Germination rate	Seedling mortality at 30 days (%)	Germination at12 days (%)		12 days	8 days	5 days		
**16.5981	**6723.37	**3083.38	**9.16076	**3583.5	**4627	**5032	18	Treatment
0.0099	0.2178	0.3531	0.0092	0.3531	0.337	0.4079	57	Error
4.79	1.29	1.95	4.03	1.12	1.19	1.44	-	CV

Results in abnormal rooting of seed treatments with Baytan and Larvin revealed that seed disinfection with more than 0.5 in thousands of Baytan, and 7.5 in Thousand Larvin alone causes abnormal roots production in cotton (Fig. 1).

Fig. 1: Dwarfing and Producing of abnormal root and Poly branching of Cotton roots

Combination of Larvin and Baytan abnormal roots was observed (Table 8) and the percentage of seed germination to create different effects and these effects were significant at 1% level (Table 7).

Table 6: Analysis of variance of Larvin and Baytan effects on seed germination in Station of Karkandeh Kordkouy

Germination rate	df	Source of variation
^{ns} 21.138889	3	Replication
**539.4772	11	Treatment
10.65404	33	Error
5.13	-	CV

Table 7: Effect of seed treatment with Baytan and Larvin on germination and protection of cotton seedling

Flower pot with natural infestation			Germination rate	Germination in Petri dish (%)			Fungicide and insecticide for treatment of seed (g/100kg)
Germination rate	Seedling mortality at 30 day (%)	Germination at12 days (%)		12 days	8 days	5 days	
c 4.38	a 98.5	c 62.5	a 4.17	a 91.4	a 91.4	c 79.9	Larvin 250 and Baytan,100
b 5.08	d 70.65	b 71	ab 4.11	b 87.9	b 87.5	b 82.8	Larvin 500 and Baytan,100
f 3.23	c 72.18	b 70.2	e 3	g 66.9	66.7	e 66.4	Larvin 1000 and Baytan100
g 2.33	b 70	b 68.3	a 4.18	b 87.9	b 87.6	a 87.5	Larvin, 250 and Baytan,135
d 3.6	b 70	b 70	d 3.31	d 80.4	d 80.4	d 75	Larvin, 500 and Baytan,135
i 0.9	e 67	b 62.5	f 2.83	f 70	g 58.3	f 50	Larvin 1000 and Baytan135
e 3.38	g 45.13	b 65.2	c 3.6	e 75	e 75	d 75	Larvin, 250 and Baytan,150
d 3.58	e 67	a 80	b 4	c 83	c 83	b 83	Larvin, 500 and Baytan,150
a 6	h 0	a 82.8	b 4	c 83	c 83	b 83	Larvin 1000 and Baytan150
k 0	h 0	d 45	j 0.73	m 13.5	j 13.5	13.3$_h$	Larvin, 250 and Baytan,375
j 0.3	h 0	k 4.16	k 0.57	j 24.8	k 8	k 0	Larvin, 500 and Baytan,375
k 0	h 0	l 0	i 0.93	j 28.5	j 13.3	h 13	Larvin 1750 and Baytan375
h 1.1	h 0	e 29.1	g 2.49	e 75	h 42.5	g 28.5	Larvin, 250 and Baytan,750
i 0.93	h 0	f 21	l 0.43	n 8	k 8	i 8	Larvin, 500 and Baytan,750
j 0.32	h 0	j 8.21	j 0.72	i 28.8	j 13	j 4	Larvin 1750 and Baytan750
k 0	h 0	g 0	h 1.56	h 50	i 29	i 8	Larvin 250 and Baytan1750
k 0	h 0	g 0	jk 0.59	l 17	k 8	i 8	Larvin 500 and Baytan1750
k 0	h 0	g0	kl 0.50	k 20.8	k 8	k 0	Larvin 1750 and Baytan1750
c 4.5	f 62.13	c 62.4	c 3.63	e 75	e 75	d 75	distilled water

Table 8: Effect of Baytan and Larvin on germination and abnormal lateral roots in Station of Karkandeh Kordkouy

rhizogenesis abnormal*	percentage of germination at30 days after sowing	Insecticide for treatment of seed (g/100kg)
-	^{e} 54.75	750 gram of Larvin
++	^{ab} 75.75	1500 gram of Larvin
-	^{bc} 71.25	50 gram of Baytan
+	^{d} 60.50	100 gram of Baytan
+++	^{c} 69.25	250 gram of Baytan
+	^{e} 54.75	50 gram of Baytan and 750 gram of Larvin
+++	^{a} 77.25	50 gram of Baytan and 1500 gram of Larvin
++	^{c} 69.50	100 gram of Baytan and 750 gram of Larvin
+++	^{c} 67.25	100 gram of Baytan and 1500 gram of Larvin
++	^{c} 67.75	250 gram of Baytan and 750 gram of Larvin
++++	^{f} 35	250 gram of Baytan and 2500 gram of Larvin
-	^{d} 60.75	distilled water

ANOVA analysis indicated significant differences for the field. The simple effect of insecticides on the characteristics of the experiment (mixing Baytan and insecticides Larvin and Gaucho) (Table 9).

Table 9: Analysis of variance of Larvin and Gaucho and Baytan effects on characters of cotton in the Central Station of Agriculture and Natural Resources Research Tehran province

abnormal roots	Height cm(plant)	Length of root (cm)	Mortality at 30 days (%)	Germination rate	Germination at 15 days (%)(x100)	df	Source of variation
24.91**	0.009^{ns}	42.965**	0.01**	7.1530^{ns}	0.032**	3	Replication
^{ns} 1.563	^{ns} 0.002	3^{ns}	^{ns} 0.0005	^{ns} 4.3660	^{ns} 0.013	2	insecticide (I)
^{ns} 5.632	^{ns} 0.003	^{ns} 4.91	0.005**	^{ns} 11.262	0.022*	3	Baytan (F)
^{ns} 6.090	^{ns} 0.006	^{ns} 1.3060	^{ns} 0.001	^{ns} 4.8640	^{ns} 0.004	6	I × F
^{ns} 3.758	^{ns} 0.017	^{ns} 1.8440	^{ns} 0.001	^{ns} 7.5	^{ns} 0.006	33	Error
16.41	11.25	14.02	19.44	18.44	7.67	-	CV%

Showed that there was no significant difference between the characters that were analyzed by Duncan and are not capable of grouping for insecticides used alone. And due to the lack of fungicidal activity of the insecticide plant death 20-35%, much more than when the seed is just delinted. Results on the mixing effects of pesticides Larvin, Baytan fungicides and Gaucho on different characteristics under field conditions showed significant effects on the percentage of Varamin cultivar germination rate, seedling death percentage, root length, plant height and numbers of lateral roots. Seed treatment by Baytan at rate of 1-1.5 in thousands and use of Gaucho and Baytan in dry regions do not have any bad effect on cotton seedling and will protect seedling against thrips and diseases during early season (Table 10).

Table 10: Effects of Larvin and Gaucho and Baytan on characters of cotton in the Central Station of Agriculture and Natural Resources Research Tehran province

Abnormal roots	Height plant (Cm)	Length of root (cm)	Mortality at 30 days (%)	Germination rate	Germination at 15 days (%)	treatment of seed (g/100kg)	
						Baytan	Insecticide
11.50 a	14.68 a	9.938 a	1.351 a	14.306 a	0.944 a	-	-
12.13 a	14.25 a	9.938 a	1.229 a	14.931 a	0.990 a	-	70g Gaucho
11.81 a	14.50 a	9.188 a	1.205 a	15.344 a	0.996 a	-	70 g Larvin
10.92 a	14.33 a	10.0 ab	1.01 b	15.976 a	1.00 a	-	-
11.92 a	15.00 a	9.00 b	0.98 b	14.642 a	1.00 a	100 g	-
11.83 a	14.00 a	9.33 ab	1.64 a	13.658 a	0.92 b	125 g	-
12.58 a	14.58 a	10.4 a	1.42 ab	15.175 a	0.97 ab	150 g	-
9.75 b	13.75 a	10.0 ab	1.000 b	14.90 a	1.00 a	-	-
10.75 ab	15.75 a	9.00 b	0.859 b	14.00 a	0.973 ab	100 g	-
12.75 a	13.50 a	9.75 ab	2.045 a	13.30 a	0.944 ab	125 g	-
12.75 a	15.75 a	11.0 a	1.500 ab	15.03 a	0.860 b	150 g	-
5.50 a	15.25 a	9.75 ab	1.31 ab	17.00 a	1.000 a	-	70 g
6.25 a	13.50 a	10.0 a	0.834 b	15.35 a	1.000 a	100 g	Gaucho
6.00 a	14.75 a	9.50 b	1.280 ab	13.88 a	0.959 b	125 g	
4.25 a	13.50 a	10.5 a	1.672 a	13.50 a	0.944 b	150 g	
12.25 a	14.00 a	10.25 a	1.208 ab	16.00 a	0.992 ab	-	70 g Larvin

11.50 b	15.75 a	8.000 b	0.944 b	14.58 a	1.000 a	100 g
11.75 ab	13.75 a	8.750 ab	1.596 a	13.80 a	0.939 b	125 g
11.75 ab	14.50 a	9.750 ab	1.072 b	17.00 a	1.000 a	150 g

Assess the simple effects of pesticides on the characteristics of experiments (mixing Carboxin- thiram and insecticides Larvin and Gaucho) showed that there is no significant difference between the characters (Table 11).

Table 11: Analysis of variance of Lavin, Gaucho and Carboxin–thiram effects on characters of cotton in the Central Station of Agriculture and Natural Resources Research Tehran province

Source of variation	df	germination at 15 days (%)(x100)	germination rate	Mortality at 30 days (%)	Length of root (cm)	Plant height (cm)	Abnormal roots
Replication	3	0.584**	1.854_{ns}	0.207**	^{ns} 6.556	10.39_{ns}	^{ns} 0.521
Insecticide(I)	2	^{ns} 10.023	^{ns} 6.890	^{ns} 0.063	13*	^{ns} 5.083	^{ns} 8.853
Fungicide (F)	3	^{ns} 0.059	^{ns} 5.821	^{ns} 0.072	** 23.22	^{ns} 4.72	^{ns} 2.632
I × F	6	^{ns} 0.012	^{ns} 2.407	^{ns} 0.025	** 20.89	^{ns} 5.472	*11.361
Error	33	0.031	^{ns} 2.804	^{ns} 0.041	3.89	^{ns} 8.465	^{ns} 4.051
CV%	-	14.86	13.38	24.32	24.32	17.02	24.46

In other word the use of Larvin and Gaucho insecticide at rate of 7 per thousand and fungicides Carboxin- thiram with ratio of 4-6 per thousand can be used alone or in combination with each other for disinfecting seed. Changes in the number of lateral roots and root length are due to seed quality (Table 12).

Table 12: Effects of Larvin, Gaucho and Carboxin- thiram on characters of cotton in the Central Station of Agriculture and Natural Resources Research Tehran province

Abnormal roots	Plant height (cm)	Length of root (cm)	Mortality at30 days (%)	Germination rate	Germination at15 days (%) (x100)	treatment of seed (g/100kg)	
						Carboxin - thiram	Insecticide
7.94 a	16.5 a	13.00 ab	0.826 a	12.013 a	1 a	-	-
7.69 a	17.6 a	11.75 b	0.649 a	13.259 a	1 a	-	70 g Gaucho
9.06 a	17.1 a	13.50 a	0.746 a	12.281 a	1 a	-	70 g Larvin
7.75 a	16.92 a	13.00 ab	0.902 a	11.908 a	1 a	-	-
8.00 a	16.83 a	12.33 ab	0.623 a	13.117 a	1 a	40 g	-
8.83 a	8.000 b	11.17 ab	0.772 a	11.921 a	1 a	50 g	-
8.33 a	16.58 a	14.50 a	0.664 a	13.125 a	1 a	60 g	-
7.25 b	16.25 a	16.00 ab	1.00 a	11.125 a	1 a	-	-
7.25 b	17.50 a	12.75 bc	0.69 b	12.50 a	1 a	40 g	
10.0 ab	17.00 a	10.50 c	0.76 b	12.20 a	1 a	50 g	
12.8 a	15.25 a	12.75 bc	0.852 ab	12.23 a	1 a	60 g	
8.25 a	18.00 a	9.750 b	0.978 a	12.15 c	1 a	-	70 g Gaucho
8.75 a	15.50 b	11.00 b	0.527 b	14.18 a	1 a	40 g	
5.50 b	18.75 a	12.75 ab	0.555 b	13.013 bc	1 a	50 g	
8.25 a	18.25 a	13.50 a	0.535 b	13.70 ab	1 a	60 g	
7.75 b	16.50 a	13.25 b	0.729 a	12.45 ab	1 a	-	70 g Larvin
8.00 b	17.50 a	13.25 b	0.651 a	12.675 ab	1 a	40 g	
1.00 a	18.25 a	10.25 c	0.998 a	10.55 b	1 a	50 g	

9.50 ab	16.25 a	17.25 a	0.605 a	13.45 a	1a	60 g

Examine the effects of pesticides on the characteristics (mixing pesticides in Carbendazim and Larvin and Gaucho) showed that there is no significant difference between the characters (Table 13).

Table 13: Analysis of variance of Larvin, Gaucho and Carbendazim effects on characters of cotton in the Central Station of Agriculture and Natural Resources Research Tehran province

Source of variation	df	germination at15 days (%)(x100)	germination rate	Mortality at 30 days (%)	Length of root (cm)	Plant height (cm)	Abnormal roots
Replication	3	0.032*	19.57ns	0.375**	^{ns} 1.965	^{ns}0.025	^{ns} 4.556
Insecticide(I)	2	^{ns} 0.024	^{ns} 12.106	^{ns} 0.087	9.896_{ns}	^{ns} 0.014	^{ns} 5.813
Fungicide (F)	3	^{ns} 0.015	^{ns} 9.472	^{ns} 0.062	** 26.576	^{ns} 0.082	^{ns} 2.722
I × F	6	^{ns} 0.020	^{ns} 11.397	** 0.145	** 34.45	^{ns} 0.301	^{ns} 3.785
Error	33	0.01	10.572	0.036	3.390	0.265	^{ns} 2.54
CV%	-	10.71	20.79	16.47	14.70	14.29	22.77

Duncan is not capable of grouping treatments for insecticide which was used alone. Examine the effect of the concentration of fungicide Carbendazim, results showed no significant differences between the characters. Mixed results regarding the effects of pesticides in Carbendazim fungicide Larvin and Gaucho on different characteristics under field conditions showed significant effects on the percentage of plant death and root length. In other words Larvin insecticide and Gaucho with ratio of 7 per thousand and Carbendazim fungicide with ratio of 2-2.5 in a thousand can be used alone or in combination with each other for disinfecting cotton seed. Changes in the number of secondary roots and primary root length are due to seed quality (Table 14).

Table 14: Effects of Larvin, Gaucho and Carbendazim on characters of cotton in the Central Station of Agriculture and Natural Resources Research Tehran province

Abnormal roots	Plant height (cm)	Length of root (cm)	Mortality at 30 days (%)	Germination rate	Germination at15 days (%)	treatment of seed (g/100kg)	
						Carbendazim	Insecticide
6.563 a	12.938 ab	12.625 a	1.342 a	16.561 a	0.973 a	-	-
6.750 a	13.188 b	11.688 a	2.144 a	15.538 a	0.900 a	-	70 g Gaucho
7.688 a	13.500 a	13.250 a	1.886 a	14.831 a	0.912 a	-	70 g Larvin
6.417 a	14.00 a	13.667 a	1.659 a	16.365 a	0.932 a	-	-
6.833 a	13.33 a	11.833 ab	1.837 a	16.208 a	0.935 a	200 g	-
7.25 a	12.50 a	10.750 b	1.381 a	15.592 a	0.967 a	225 g	-
7.50 a	13.00 a	13.833 a	2.285 a	14.408 a	0.880 a	250 g	-
5.75 b	15.00 a	17.250 a	1.000 ab	17.970 a	1.000 a	-	-
6.25 b	12.00 a	12.25bcde	0.778 bc	18.225 a	1.000 a	200 g	-
7.50 ab	13.50 a	9.000 e	1.644 abc	14.300 a	0.932 abc	225 g	-
6.75 ab	11.25 a	12.0 bcde	1.944 abc	15.570 a	0.924 abc	250 g	-
7.50 ab	13.00 a	8.75 e	1.950 ab	15.175 a	0.891 abc	-	70 g Gaucho
6.75 ab	12.50 a	10.75 cde	2.783 a	14.700 a	0.826 c	200 g	70 g Gaucho
6.00 b	11.50 a	13.25 bcd	0.711 c	18.075 a	1.000 a	225 g	70 g Gaucho
6.75 ab	15.75 a	14.00 bc	3.133 a	14.200 a	0.836 bc	250 g	70 g Gaucho
6.00 b	14.00a	15.00 ab	2.028 ab	15.950 a	0.905 abc	-	70 g Larvin
7.50 ab	15.50 a	12.50bcde	1.950 abc	15.700 a	0.942 abc	200 g	70 g Larvin
8.25 ab	12.50 a	10.00 de	1.789 abc	14.400 a	0.921 abc	225 g	70 g Larvin
9.00 a	12.00 a	15.50 ab	1.778 bc	13.275 a	0.881 abc	250 g	70 g Larvin

DISCUSSION AND SUGGESTIONS

From the total results of these two experiments and with attention to the main goal of seed treatment with fungicide (protection of seedling from cause's disease) it can be claimed that the goal can be reach by using 2.5 in thousands. But due to delayed emergence and plant growth with this concentrations countenance of plant growth would be a problems and the percentage of plant deaths can be increased after seed germination. In other words, at a concentration of 2.5 in a thousand pre emergence damping off decrease, but post emergence damping off will increase. Therefore, the risk of low consumption. According to the main purpose of disinfectant pesticides (plant protection against early season pests), at a concentration of 17.5 in thousand decrease in germination rate and delays in plant growth occurs. Besides these pesticides can't protect the plant against attack of pathogens. Therefore, the risk of low consumption, seed disinfectant pesticides Larvin is 5 to 10 per thousand. According to the main purpose of disinfection with fungicide and insecticide usage in bytes 1 or 1.5 and 5 or Larvin 10 per thousand, and the most appropriate dose for disinfection of seed 1 or 1.5 in thousand Baytan and 10 per thousand Larvin (Table 6). Effect on the production of adventitious roots the most appropriate combination of 0.5 in thousands Baytan and 7.5 in thousands of Larvin and 1 in thousands Baytan and 7.5 in thousands Larvin. Other compounds produced adventitious roots in the excessive growth of plant roots is multidisciplinary. Lack of root elongation, multidisciplinary roots causes impaired absorption of water and plant roots cannot tolerate aboveground and cause logging (Fig. 2).

A

B

Fig. 2: Dwarfing and Producing of Abnormal Red Root Under the Effect of Treatments of Cotton Seed more than 7.5 Gram Larvin and more than both application 5 Gram Baytan and 7.5 Gram Larvin in 1000 Gram of Cotton Seed

Limit seedling root elongation, increased lateral root and seed growing abnormally and slowly increase the susceptibility of plants to pathogens and increased damping off in field. Systemic insecticide seed treatments on conditional seed increases abnormal roots. Also treated damage seed with systemic insecticide and fungicide causes high production of abnormally root and consequently increases the seedling mortality rate. Seeds kept in storage for a long time their quality will reduce and germination is not uniform, the cavity (gap) is created in their shells. These seeds have low vigor, with low and weak root systems and sometimes produce shallow root and in many cases after germination, seedlings cannot bear weight and are prone to attack by pathogens. Bytes fungicides are from three- azole group which are more known as likeness plant hormone and their activity is like gibberellins. Gibberellins helps the vertex meristem cell division, therefore increase rooting are expected from these fungicides. Seed treatment with 1.25 and 1.5 of Baytan in a thousand is most appropriate dose in the cotton fields in arid regions and increase protecting the plant against attack by pathogens and this concentrations decrease the percentage of damping off. The root length density did not decline and will not produce adventitious roots of plants. While more dose causes abnormal l increases and decreases the length of main root. In humid and wet regions, such as the provinces of Golestan. The used of this fungicide is not suitable in case of use with the 0.5 in thousands should is recommended for seed disinfection (Fig. 3).

Fig. 3: Dwarfing and Producing of Abnormal Rooting of Cotton Seedling

These findings indicate that in cool and wet regions and seeds with low quality must avoid using the application of these fungicides or only using concentration of less than 0.5 in thousands. Based on studies seeds with higher qualities are produced in areas with little or no rainfall, relative humidity. These types of seeds germinate and grow slowly and growth percentage with decreasing temperature is lower. Had to endure the cold and have high resistance against rot. Seedling obtained from these seeds does not have abnormal roots and have tolerant against attacking pathogens and tolerance is not unusual. Systemic insecticides should only be used for disinfecting these seeds. Seeds for planting in regions or in region with chemicals seeds treatment have limitations or conditions and limitations have been placed. Seeds with conditional quality are called (conditioned quality seed). These seeds compared to high quality seed their germination and growth lower faster when temperature decreases. The seeds have a low resistance to cold and some seedling plants from the seeds have abnormal roots and seedlings are susceptible to pathogens attack. Seed coat of these seeds has greater sensitivity to the seed rotting pathogens and therefore less resistant to attack of seed rot and damping off factors. The seeds should not be used for early planting. These seeds are good for areas which soil moisture decreases immediately after planting. Chemical seed treatments for seedling protection these seeds are necessary. Systemic fungicides and non- systemic insecticides can be used for disinfecting these seeds. This study showed that in cold and wet regions with planting low quality seed must avoid using it or use with low concentration less than 0.5 in thousand. In dry regions with high quality seeds or in regions where seeds emergence faster and with late planting the possibility use of these fungicides are existence. In addition Larvin insecticide and Gaucho with rate of 7 per thousand and Carboxin - thiram with rate of 4-6 per thousand can be used alone or in combination for cotton seed treatment for disinfection. Results also showed that Larvin insecticide and Carbendazim fungicide with rate of 7 in thousand and Carbendazim fungicide with ratio of 2 to 2/5 in a thousand can be used alone or in combination with the seed for disinfection. The priority is used for disinfection of seed cotton in arid regions, respectively, are Gaucho and Carboxin-thiram, Larvin and Carboxin-thiram, Gaucho and Carbendazim, Carbendazim and Larvin, Baytan and Gaucho, Baytan and Larvin, recommended. So the selection of chemicals for seed cotton should be given to areas of common pathogens, pathogen city temperature range, performance and effectiveness of fungicides, planting date, seed quality and pest early season pests.

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