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THE EFFECTS OF SEED TREATMENTS WITH FUNGICIDES ON STEM ROT CAUSED BY *SCLEROTIUM ROLFSII* SACC., IN PEANUT

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Abstract

The effects and the possibility of using some systemic fungicides as seed treatments with different active ingredients against stem rot caused by *Sclerotium rolfsii* in peanuts were investigated. The effects of fungicides on mycelial growth of pathogen and seed germination of peanuts *In vitro* were determined. Severity of disease and yield were determined with pot experiments under controlled conditions as well as field experiments which were conducted for two years. Fungicides decreased the germination disorders caused by some fungal agents (*Aspergillus* spp., *Rhizopus* sp., *Penicillium* spp.) in and/or on the surface of seeds significantly and treatments provided an increase in germination ratio of seeds by 64-96%. Seed treatments decreased the disease severity in pot experiments under controlled conditions and field experiments by 74.3% and 34.2%, respectively. Fungicides having mixture of different active ingredients named tolclofos-methyl 200g/kg + thiram, 200g/kg, carboxin 200g/L + thiram 200g/L, fludioxonil, 100g/L and azoxystrobin 75g/L + fludioxonil 12.5g/L + metalaxyl-M 37.5g/L decreased the disease severity of pathogen in all experiments significantly and it was concluded that seed treatments with these fungicides provided substantial contribution to control of disease.

Introduction

Stem rot or white rot caused by *Sclerotium rolfsii* Sacc. is one of the most important disease in peanuts that limits the yield production. The disease occur almost all producing areas can survive 3-4 years in soil as scleroa formed by pathogen and result 25-80% yield loss with severe infections at the condition of intensive inocula level (Porter *et al*., 1984). Infected plants with several leaves stage have shown yellowing and wilting of leaves and branches. Mycelial growth after sclerotial germination increases rapidly and spreads to other branches and plants on the rows under suitable environmental conditions. Meanwhile, black and hard bodies called sclerotia are formed on infected plant parts and surface of soil abundantly and then plants may die.

The control practices of stem rot disease include cultural methods such as plant rotation, deep soil processing and weed control as well as soil solarization, using antagonistic microorganisms or fungicides treatments after sowing on the plant rows (Garren, 1961; Mihaik & Alcorn, 1984; Papavizas & Collins, 1990; Damicone & Jackson, 1994). Plant rotation with maize and wheat resulted in a decrease in the stem rot of peanut by 50%; the disease development was decreased with 90cm line space by 29.3%; the disease was suppressed with applying 2kg *Trichoderma harzianum* corn meal-sand culture per m^2 by 71.4% (Biçici *et al*., 1994). The disease occurence was prevented with application of PCNB when spraying to crown of plants by 54%, while flutolanil and tebuconazole applications to green parts prevented the disease formation by 82% and 70%, respectively (Damicone & Jackson, 1994).

In some cases, some fungicides used for the control of leaf spots can control these diseases while the occurence of soilborne diseases can be increased. Application of captafol and chlorothalonil fungicides used for *Cercospora* leaf spot resulted in an increase in root and crown rot severity caused by *Sclerotinia minor*. The results of the field experiments in different years showed that captafol and chlorothalonil with 1.68 $kg \cdot ha^{-1}$ and 1.26 $kg \cdot ha^{-1}$ doses, as sprayed during three different stages of plants, the deaths of plants caused by *S. minor* were 60% and 29% in captafol and chlorothalonil treatments, respectively, while 23% in control group. In addition, the fungicides applications resulted in a decrease in yield (Porter, 1980).

The aim of this study was to determine the effects of systemic fungicides using as seed treatments on development of stem rot in peanuts, the mycelial growth of *Aspergillus niger* and *S. rolfsii in vitro* and the germination ratio of seeds.

Materials and Methods

In this study, American type peanut cultivar (*Arachis hypogea* L.) grown commonly in Adana district used as a plant material and *Sclerotium rolfsii* was isolated from naturally infected peanut plants. The systemic fungicides used in all experiments (Fludioxonil 100g/L; Azoxystrobin 75g/L + Fludioxonil 12.5g/L + Metalaxyl-M 37.5g/L; Fludioxonil 25g/L + Metalaxyl-M 10g/L; Tolclofos-Methyl 500g/L; Tolclofos-Methyl 200g/kg + Thiram 200g/kg; Carboxin 200g/L + Thiram 200g/L) were obtained from some agricultural firms.

The effects of fungicides on mycelial growth of *Aspergillus niger* and *Sclerotium rolfsii In vitro*: Mycelial growth of *Sclerotium rolfsii* and *Aspergillus niger*, inhabitant in seeds and in soils caused death of seed and seedlings under inconvenient soil conditions were examined on PDA (Potato Dextrose Agar) contained fungicides. For this purpose, fungicides concentrations at 0.5, 1.0, 5.0, 10, 25, 50 and 100ppm were included in PDA in 9cm diameter Petri dishes and 5mm of mycelial discs of freshly cultured *S. rolfsii* maintained for 4 or 5 days on PDA were added into those Petri dishes. Control Petri dishes had no fungicides. After 4 days, colony diameters were measured. Experiments were designed as a completely randomized block design with five replications and three in each.

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The effects of fungicides on seed germination of peanuts: Ingredients of the fungicides used as seed treatments in this experiment are shown in Table 1. For the purpose of the determination of the effects on seed germination of peanut, fungicides were diluted in the above mentioned concentrations with adequate water and mixed with seed until obtaining a good coverage and then seeds were dried at room temperature. Seeds were sown in containers 5 cm depth and 100 seeds were used for each characters. Untreated seeds were also included in the experiment. Containers were placed in controlled growing chamber with 5000 lux light intensity, 12 hr photoperiod at 24±2°C temperatures. After 20-25 days, the germinated seeds were counted and percentages of germination were determined.

Table 1. Fungicides used and seed treatment dosages in the experiment.

Active ingredient	Dosages (ml/100 kg seed)
Fludioxonil 100 g/L	250
Azoxystrobin 75 g/L + Fludioxonil 12.5 g/L + Metalaxyl-M 37.5 g/L	250
Fludioxonil 25 g/L + Metalaxyl-M 10 g/L	300
Tolclofos-Methyl 500 g/L	300
Tolclofos- Methyl 200 g/kg + Thiram 200g/kg	300
Carboxin 200g/L + Thiram 200 g/L	500

The experiment carried out with pathogen free sand was repeated with another experiment using filter paper. For this, sterile filter papers were placed in plastic containers with 28 x 43cm dimension and 100 seeds were placed for each treatment then coated with sterile filter paper again and moisture with sterile distilled water. Containers were covered with stretch film for preventing the moister lost. The germinated seeds were recorded after one week.

The effects of fungicides on development of stem rot under controlled conditions: The effects of seed applications of the fungicides doses as indicated in Table 1 on stem rot of peanuts were investigated with pot experiment under controlled conditions (5000 lux light intensity and 12 h photoperiod at 24±2°C). Treated seeds were dried overnight at room temperature and then sown in pots with 15cm diameter containing sand, soil and manure (1:1:1:) with three seeds in each and seeds were covered with thin layer of soil mixture. Approximately 25-30 sclerotia (50-55mg) were added into these pots and again covered with soil mixture and watered. Experiment was conducted with 4 replications and 3 pots in each and 84 pots were used in total. After 3 months, plants were harvested and symptoms were evaluated using the 0-4 scale explained below.

The scale used according to the infections of plant stems as follows:

0: Healthy plant
1: Infection rate < 25%
2: Infection rate 26-50%
3: Infection rate 51-75%
4: Dead plant

Disease severity was calculated using scale values according to the Tawsend-Hauberger Formula and variance analysis was performed and treatments means were compared statistically using Duncan test.

The effects of fungicides on disease development under field conditions: Experiments were conducted in naturally infected field (400m^2) peanuts grown in previous years with soil properties of 53.6% clay, 21.4% silt, 25.0% sand, pH: 7.6. In the experiments, 20-25kg/da diamonium phosphat (DAP, 18-46-0) was applied before sowing as subsoil fertilizer then the treated seeds were sown. Plots were arranged as 12.6m^2 dimension for each characters with 6m length and 3 rows and 70cm was left between rows.

S. rolfsii was inoculated to seed bed as 100mg sclerotia (app. 545 units) mixed with 750ml sand for three rows in one plot and then 60 seeds were sown in 10cm space on one row. Experiment was designed as a randomized complete block design in the field with four replications with 7 plots in each block and 28 plots in total. After sowing, rainy irrigation was performed for supplying plant outlet in the experiment area and Ammonium sulphate was applied on the account of 7kg pure nitrogen in first irrigation during plant development and 8kg ammonium nitrate during second irrigation. At harvest, disease evaluation was performed according to Bowen *et al*., (1992). Disease loci in each row in every row in each plot was examined and scale rates were given according to the length of disease loci namely 1 for 0-30 cm, 2 for 31-60cm, 3 for 61-90cm and 4 for over 90cm and disease locus were calculated for each plot. In addition, yield was measured after harvest for each plot.

Statistical analysis: The data were subjected to analysis of variance. Means were compared using Duncan's test at P = 0.05 (Gomez & Gomez, 1983).

Results

The effects of fungicides on mycelial growth of *Aspergillus niger* and *Sclerotium rolfsii In vitro*: It was observed that *S. rolfsii* had more sensitivity to these fungicides than *A. niger*, while fungicides amended with PDA between 0.5 to 100ppm concentrations decreased the mycelial growth of both fungi with increasing concentrations. In the experiment carboxin + thiram prevented the mycelial growth of *S. rolfsii* the most effectively among fungicides while it could not prevent the mycelial growth of *A. niger* in the same way. carboxin + thiram suppressed the growth of *S. rolfsii* by 84.2% at 1ppm concentration on the other hand mycelial growth of *A. niger* was decreased only 26.8% even at 50ppm concentration amended to the medium. Wettable powder formulation of tolclofos-methyl + thiram prevented the

mycelial growth of both fungi remarkably while liquid formulation of this fungicide without thiram did not show the same expected effect. This fungicide decreased the mycelial growth of *A. niger* and *S. rolfsii* by 42.7% and 23.9% at 100ppm concentration, respectively.

It was observed that fungicides which contained fludioxonil or one or more active ingredient belonging to other groups decreased growth of both fungi effectively depending on fludioxonil concentration. However, the inhibition effect of these fungicides on *A. niger* were more evident than those of *S. rolfsii*. Celest contained 100 g/L fludioxonil decreased the mycelial growth of *A. niger* and *S. rolfsii* by 87.9% and 49.9% for 5ppm, respectively (Table 2).

Table 2. The effects of fungicides on mycelial growth of *A. niger* and *S. rolfsii In vitro*.

Concentrations (ppm)	Fungicides						
	Fludioxonil	Azoxystrobin + fludioxonil + metalaxyl	Fludioxonil + metalaxyl	Tolclofos methyl	Tolclofos methyl + thiram	Carboxin + Thiram	Control (nontreated)
	Colony diameter of *A. niger* (mm)						
0.5	14.5 a*	36.8 cd	29.8 b	37.4 cd	35.8 c	38.6 cd	39.6 d
1.0	8.3 a	35.3 c	23.3 b	35.0 c	34.0 c	36.1 c	39.6 c
5.0	4.8 a	35.0 d	7.0 b	34.6 d	26.0 c	35.8 d	39.6 e
10.0	3.3 a	34.4 d	6.3 b	34.5 d	19.8 c	35.4 d	39.6 e
25.0	3.0 a	31.8 c	3.9 a	34.4 d	18.0 b	35.3 d	39.6 e
50.0	2.8 a	18.3 b	3.3 a	33.8 d	2.4 a	29.0 c	39.6 e
100.0	0.0 a	0.0 a	0.0 a	22.7 b	0.0 a	19.9 b	39.6 c
	Prevention ratio (%)						
0.5	63.3	7.0	24.7	5.5	9.5	2.5	-
1.0	79.0	10.9	41.2	11.6	14.1	8.8	-
5.0	87.9	11.6	82.3	12.6	34.3	9.5	-
10.0	91.6	13.1	84.1	12.9	50.0	10.6	-
25.0	92.4	19.7	90.2	13.1	54.5	10.9	-
50.0	93.0	93.0	91.7	14.6	94.0	26.8	-
100.0	100.0	100.0	100.0	42.7	100.0	49.7	
	Colony diameter of *S. rolfsii* (mm)						
0.5	60.0 c	47.8 b	63.0 cd	71.7 e	62.7 cd	17.7 a	65.3 d
1.0	49.3 c	39.7 b	63.7 de	68.7 e	61.3 d	10.3 a	65.3 de
5.0	32.7 b	34.0 b	52.7 c	70.3 d	0.0 a	0.0 a	65.3 d
10.0	14.7 b	28.0 c	38.7 d	64.7 e	0.0 a	0.0 a	65.3 e
25.0	0.0 a	17.7 b	16.7 b	62.2 c	0.0 a	0.0 a	65.3 c
50.0	0.0 a	14.3 b	0.0 a	61.0 c	0.0 a	0.0 a	65.3 d
100. 0	0.0 a	0.0 a	0.0 a	49.5 b	0.0 a	0.0 a	65.3 c
	Prevention ratio (%)						
0.5	8.1	26.8	3.5	-9.8	3.9	72.9	-
1.0	24.5	39.2	2.5	-5.2	6.1	84.2	-
5.0	49.9	47.9	19.3	-7.6	100.0	100.0	-
10.0	77.5	57.1	70.7	0.9	100.0	100.0	-
25.0	100.0	72.9	74.4	4.7	100.0	100.0	-
50.0	100.0	78.1	100.0	6.6	100.0	100.0	-
100.0	100.0	100.0	100.0	23.9	100.0	100.0	-

* Means within line followed by different letters are significantly different (p=0.05) according to Duncan multiple range test

The effects of fungicides on seed germination of peanuts: All fungicides used in the experiment had no negative effects on seed germination in contrast they increased the germination ratio. Different fungi such as *Aspergillus niger, Aspergillus flavus, Penicillium* sp. and *Rhizopus* sp. were developed depending on the humidity on the seeds of groups while this ratio changed from 66 to 96% obtained from tolclofos-methyl and tolclofos-methyl + thiram, respectively. On the other hand, fungi mentioned above were developed at lower degree on the seeds sown in sand but germination ratio was increased more than those on filter papers. Seed germination ratios were calculated as 82% in both control groups and tolclofos-methyl in sand medium, while the highest effect of germination ratio (94%) was obtained from Fludioxonil + Metalaxyl-M treated seeds (Table 3).

Table 3. The effects of fungicides on germination ratio of seeds.

Fungicides	Seed germination ratio (%)	
	Filter paper	Sand
Fludioxonil 100 g/L	94	88
Azoxystrobin + Fludioxonil + Metalaxyl-M	88	90
Fludioxonil + Metalaxyl-M	78	94
Tolclofos-Methyl	66	82
Tolclofos- Methyl + Thiram	96	86
Carboxin + Thiram	82	88
Nontreated Control	64	82

The effects of fungicides on stem rot of peanut under controlled conditions: According to the results of the pot experiment, all fungicides except the Fludioxonil + Metalaxyl-M and tolclophos methyl decreased significantly the development of stem rot caused by *S. rolfsii* compared to control. Disease severity was calculated as 26.9% in control pots with pathogen-inoculated, non-treated, while it was found as 6.9% in Fludioxonil 100g/L treatment giving

the highest effect. The disease decreasing effect of Fludioxonil 100g/L was 74.3% according to Abbot formula, while they were 73.1%, 67.4% and 67.3% in Carboxin + Thiram, Azoxystrobin + Fludioxonil + Metalaxyl-M and Tolclofos- Methyl + Thiram, respectively. However, Fludioxonil + Metalaxyl-M and Tolclofos-Methyl prevented the disease severity by 20.3% and 23.1%, respectively, similar to control (Table 4).

Table 4. The effects of seed treatments of fungicides on stem rot of peanut caused by *S. rolfsii* under pot condition.

Fungicides	Disease Severity (%)	% Effect (Abbott)
Fludioxonil 100 g/L	6.90 a*	74.3
Azoxystrobin + Fludioxonil + Metalaxyl-M	8.77 a	67.4
Fludioxonil + Metalaxyl-M	21.43 b	20.3
Tolclofos-Methyl	20.70 b	23.1
Tolclofos-Methyl + Thiram	8.78 a	67.3
Carboxin + Thiram	7.23 a	73.1
Sclerotium rolfsii	26.90 b	-

*Means within column followed by different letters are significantly different (p=0.05) according to Duncan multiple range test

The effects of fungicides on disease severity of stem rot under field conditions: In the field experiments conducted in two years, seed treatments of fungicides decreased disease development remarkably; however their effects were not higher than those of controlled conditions. Tolclofos-Methyl + Thiram was the most effective fungicide in decreasing the number of infection loci in a two-year field experiment. By reviewing the sum of data obtained by measuring the length of infection loci occurred in plots, the number of infection loci and yield per unit area were different from each other by years. Generally, fungicide applications of seeds decreased the number of infection loci and increased the yield. However according the results of the second year; their effects on decreasing disease were different. According to the results of first year experiment, total number of infection loci in control plot was 40.3, while this value was 29.6 in Tolclofos-Methyl + Thiram application and the differences between these applications were found statistically significant. It was determined that Tolclofos-Methyl + Thiram decreased the number of infection loci by 34.2% compared to control with highest effect, however the effectiveness of Fludioxonil + Metalaxyl-M and Tolclofos-Methyl were 14.9 and 11.4%, respectively showing the same effect with control. On the other hand, Fludioxonil 100 g/L, Azoxystrobin + Fludioxonil + Metalaxyl-M and Carboxin + Thiram decreased the disease loci between 20.6 and 26.6% (Table 5).

In the field experiment conducted in second year, the number of disease loci was 35.7 in control plot, while it was 26.3 in Tolclofos- Methyl + Thiram, the effectiveness of this application was different from the control statistically but Tolclofos- Methyl + Thiram was the most effective fungicide in decreasing effect of stem rot. Similarly, Azoxystrobin + Fludioxonil + Metalaxyl-M and Carboxin + Thiram decreased the disease development by 25.2 and 25.0%, respectively (Table 5).

The yield obtained from each plot were increased significantly depending on the seed treatments compared to control group. According to the results in first year experiment, Tolclofos- Methyl + Thiram and Carboxin + Thiram increased the yield by 65.2 and 57.1%, respectively. In control plot, yield was measured as 2222.2 kg per hectare, however in Tolclofos- Methyl + Thiram and Carboxin + Thiram tretments, they were recorded as 3671.5 and 3492.0 kg, respectively. In second year, yield was decreased in all plots per unit area in general. The seeds applied with Carboxin + Thiram resulted in a 2166.0 kg yield in per ha but it was recorded as 1408.9 in control plot (Table 5).

Table 5. Effects of seed treatments of fungicides on stem rot of peanut caused by *S. rolfsii* under field conditions.

Fungicides	Number of disease loci	% Effect (Abbott)	Yield (kg/ha)	Yield increase (%)
		1-Year		
Fludioxonil 100 g/L	30.4 ab	24.6	3139.1 ab	41.2
Azoxystrobin + Fludioxonil + Metalaxyl-M	32.0 ab	20.6	3306.8 ab	48.8
Fludioxonil + Metalaxyl-M	34.3 bc	14.9	2727.8 ab	22.8
Tolclofos-Methyl	35.7 bc	11.4	2182.5 b	-1.8
Tolclofos-Methyl + Thiram	26.5 a	34.2	3671.5 a	65.2
Carboxin + Thiram	29.6 ab	26.6	3492.0 a	57.1
Sclerotium rolfsii	40.3 c	-	2222.2 ab	-
		2-Year		
Fludioxonil 100 g/L	30.3 ab	14.9	1825.4 abc	29.6
Azoxystrobin + Fludioxonil + Metalaxyl-M	26.7 a	25.2	1878.3 ab	33.3
Fludioxonil + Metalaxyl-M	32.7 ab	8.4	1597.0 bc	13.4
Tolclofos-Methyl	35.3 b	1.2	1509.3 c	7.1
Tolclofos-Methyl + Thiram	26.3 a	26.4	2077.3 ab	47.4
Carboxin + Thiram	26.8 a	25.0	2166.0 a	53.7
Sclerotium rolfsii	35.7 b	-	1408.9 c	-

*Means within column followed by different letters are significantly different (p=0.05) according to Duncan multiple range test

Discussion

Generally it was determined that most of the fungicides examined in this research decreased the mycelial growth of *Aspergillus niger* and *Sclerotium rolfsii In vitro* as well as decreased negative causes of these fungi in peanut plants. Although, the main purpose of this research was to examine the stem rot caused by *S. rolfsii*, germination disorders and growth recede caused by *A. niger* also taken into consideration. A mixture of carboxin and thiram suppressed the growth of *A. niger* by 49.7% at 100ppm concentration in PDA, however *S. rolfsii* completely inhibited at 5ppm. It was indicated that carboxin was effective to *R. solani*, *Corticium rolfsii* (*S. rolfsii*) as well as the genus of *Stagonospora, Leptosphaerulina, Ustilago* and *Tilletia* belong to Basidiomycota (Vidhyasekaran, 2004). It was suggested that the lower effect of this fungicide on the mycelial growth of *A. niger* was originated from the other active ingredient thiram. On the other hand, tolclofos-methyl blocking the spore germination, appressorium formation and mycelial growth of fungi in vitro suppressed *A. niger* and *S rolfsii* at 100ppm concentration by 42.7 and 23.7%, respectively. However, thiram as in Rizolex-T formulation, showed high level effects on both fungi. Tolclofos-methyl had a high level of effect on *R. solani* but did not show the same effect on *S. rolfsii* without thiram.

On the other hand, Fungicides with fludioxonil, inhibited the mycelial growth of *A. niger* and *S. rolfsii* effectively depending on fludioxonil rate. Celest contained 100 g L^{-1} fludioxonil decreased the mycelial growth of *A. niger* and *S. rolfsii* by 91.6 and 77.5%, respectively at 10ppm concentration while 12.5g fludioxonil, inhibition ratios were found as 13.1 and 57.1%, respectively at the same dose.

Lee (2006) reported that fludioxonil at 0.92ppm concentration based on active ingredient provided the minimum inhibition dose for *S. rolfsii* growth in PDA. Besides that, fludioxonil suppressed growth of not only Sclerotium but also Alternaria, Botrytis, Botryosphaeria, Stemphylium and Rhizoctonia in vitro, however did not show any effect on some genera of fungi, such as Peronophythora, Phytophthora and Pythium. In the present study, Celest contained 10% fludioxonil with 10 ppm dose of commercial preparation had an effect of 77.5% against *S. rolfsii In vitro* and it showed much high inhibition effect compared to those of study of Lee (2006).

When the results of pot trial was examined, fungicides such as Fludioxonil 100g/L, Azoxystrobin + Fludioxonil + Metalaxyl-M , Carboxin + Thiram and Tolclofos- Methyl + Thiram were the most effective fungicides in decreasing stem rot on peanuts. In pot trial, considering high ratio of *S. rolfsii* within the soil where the plants were growing and climatic conditions were more stable compared to nature, thus these fungicides protected the plants for a long time against infection. Just as these fungicides were effective on mycelial growth of this pathogen. However, field trials results showed that protective characteristics of fungicides were decreased significantly. Results of the two-year field trials showed that the protective effect of these fungicides was important considering vegetation period completed within 5 months, plants facing with some soilborne pathogen during long period of time under natural condition and variable meteorological conditions. Wettable powder formulation of both tolclofos-methyl and thiram, was more effective fungicides than other fungicides in the field experiments. Permanence on seed, seed coverage and effectiveness on decreasing disease activity of this fungicide can be related to the formulation itself. Furthermore, Carboxin + Thiram containing two different active ingredients in its structure may attain strength to suppress pathogen depending on the thiram. It was also considered that a mixture of azoxystrobin, fludioxonil and metalaxyl-m, suppressed growth of *S. rolfsii* as well as different pathogens and contributed to yield increase under field conditions.

Ezzahiri & Khattabi (2004) reported that applications of azoxystrobin, tebuconazole or tolclofos-methyl on sugar beet decreased symptom of rots on plant and emphasized on the importance of risk evaluation and the number of application on plants.

Cariddi & Lops (1996) indicated that application of tolclofos-methyl or dichlaron 1g/m^2 against *S. rolfsii* stem rot decreased the disease formation by 42 and 35%, respectively.

Additionally, it was reported that azoxystrobin, iprodione, procymidone, tolclofos-methyl and thiram can be used against agents of stem and root rots (*Sclerotinia sclerotiorum, Sclerotium rolfsii, Rhizoctonia solani, Thielaviopsis basicola* and *Pyrenocheta lycopersici*) of tomato, pepper and eggplant (Anon., 2004).

Fungicides belonging to Triazole group inhibit the biosynthesis of ergosterol which plays an important role in structure of cell membrane of fungi (Dahmen *et al*., 1988; Waterfield & Sislar 1989). These fungicides have systemic character and can penetrate the inside of seed and can be used as seed treatment and applied to green part of plants safely (Grichar, 1995; Culbreath *et al*., 1995; Sundin *et al*., 1999). Active ingredients of these fungicides which were determined that as having no side effects on peanut seeds after germination trials comprised of triazole group mostly. It can be concluded that application of this group of fungicides can decrease the damage of weakness of parasite organisms causing storage rots and preventing seed germination and seedling development and it can also delay the occurrence of stem rot disease caused by *Sclerotium rolfsii*.

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