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POPULATION DENSITY OF MITES IN SOYBEAN FIELDS AS AFFECTED BY NODULATION AND NITROGENOUS FERTILIZATION.

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ABSTRACT

The experiment was conducted at Gemmeiza Agricultural Research Station, Gharbia in 2003 season . The study aimed to find the effect of nodulation (or not) of soybean seed with the microsymbiont *Bradyrhizobium japonicum* as well as nitrogen fertilization applied as ground fertilization at 15 and 30 kg/fed, or as spray fertilization (three sprays) at 15 and 30 kg/fed. Population density of the spider mite, *Tetranychus cucurbitacearum* (Sayed) and soil mites were evaluated .

Results indicated that population density of the phytophagous mite, *T. cucurbitacearum* on five leaflets increased significantly with nodulation, n-fertilization applied as ground or spray fertilization at 15 and 30 kg/fed.

Ground fertilization (30 kg/f.) induced the highest increase in population while the spray fertilization (15 kg/f.) caused the lowest number when compared with untreated check .

Total population densities of soil mites : Gamasida, Actinedida, Oribatida and Acaridida increased with nodulation and fertilization and this was highly noticed with nodulation and 30 kg/f. ground fertilization. Soil mites density increased according to plant growth stage all over the growing season. Oribatida and Gamasida were dominant after third spray.

INTRODUCTION

Soybean *Glycin max* Merr. is one of the most important food legume all over the world. It can derive nitrogen from soil, fertilizers and through dinitrogen-fixation by symbiosis with the specific micropartener *B. japonicum.* Soybean infestion with major pests such as the spider mite, *T.cucurbitacearum* (Mathys *et al.,* 1968; Farrag *et al.,* 1980. Yanni *et al.,* 1987 and Gamieh and Saadoon, 1995).

Soil mites are capable of acting as depredators to organic matter which leads to increase soil fertility. Some mites act as predators and parasites for different stages of injurious mites and insects (El-Kifl, 1957and 1968,Tadros, 1975and Gamieh and Saadoon, 1995).

Soil fauna always flourish and increase under different crops receiving nitrogen fertilization, while higher nitrogen levels more than the recommended does reduce their population density (Abo-Korah *et al.* ,1982, 1984 - 1985 a, b), Saleh and Tadros , 1985, Sharahir, 1986 and Rosche, 1992).

The objectives of the present work was to study the effect of nodulation of soybean seeds with the microsymbiont *B. japonicum,* and ground or spray fertilization on population densities of the spider mite *T. cucurbitacearum* and soil mites belonging to different suborders.

MATERIALS AND METHODS

A field experiment was conducted at El-Gemmeiza Agricultural Research Station Gharbia. Soybean variety Crowford was sown in 30 May 2003 in a split plot design with four replication. Each sub-plot ($21m^2$).

The main- plot treatment were seed inoculation (or not) with the microsymbiont *Bradyrhizobium japonicum* the sub-plot treatments were phosphate nitrogen fertilization applied as ground fertilization at 15 and 30 kg/f. or as spray fertilization (three sprays) at 15 and 30 kg/fed.

All moving stages of the red spider mite *T. cucurbitacearum* were recorded on the lower surface of five leaflets/plot, starting from 35 days after sowing and continued for six weeks at weekly intervals.

Total population densities of the soil mites of the suborders Acaridida, Actinedida, Gamasida and Oribatida were examined from the start 0-15 cm after a week from every nitrogen fertilization.

Soil samples were taken by metal cylinder adapted and described by El-Kifl (1957). At every sampling date, three sub plot belonging to each treatment and all were mixed together. One and half kilogram of the mixture were taken and divided into three replicates each of 0.5 kg/f. and all were transferred directly to laboratory for mites estimation.

Batteries of modified Tullgren funnels were used for mite extraction for 24 hours. Mites were identified and evaluated on the basis of total number of organisms/m^2 (the number of cylinders in each square meter was 127.30).

The data were calculated as a split-split plot design experiment with two main treatments, 5 sub-plot treatment and four replicates. Mean differences were compared to their corresponding least significant differences at the 95% confidence level (Snedecor and Cochram, 1967).

RESULTS AND DISCUSSION

A. Population density of the spider mites :

Data presented in table (1) showed the effect of nodulation and nitrogen fertilization on population density of spider mite through 35 days. There was a positive correlation between number of mites and nodulation and nitrogen fertilization. In this respect the mean number of mite on 5 leaves of the nodulated plants were 91.5 as compared with 79.9 for unnodulated plant.

Regarding nitrogen fertilization, the number of moving stage mites were increased with increasing nitrogen fertilization. The number of moving stage were (69.7 & 85.1) and (105.2 & 114.6) for 15 and 30 kg/f. spray and ground fertilization respectively as compared with 54 for unfertilized plants.

Concerning the interaction between nodulation and nitrogen fertilization. It could be noticed that the highest density of spider mite infestation with nodulated plants and fertilized with 30 kg/f. nitrogen recording a mean number of 122.8 while lowest number 51.4 was in case of unnodulated with unfertilized plants.

B. Population density of soil mites :

Data presented in table (2) indicated a positive correlation between number of soil mites belonging to suborders Gamasida, Actinedida, Oribatida and Acaridida and nodulation and nitrogen fertilization. It could be noticed that nodulation increased the number of soil mites by 16.88% than unnodulated.

As regards N-fertilization, ground fertilization recorded higher number of soil mites than spray fertilization and untreated plants. The higher dose of ground fertilization (30 kg/f.) recording higher number 1569.44 in this respect.

Considering the interaction between nodulation and fertilization, it is mentioned that nodulation, method of fertilization and dose of fertilizer play an important role in increasing soil mite. In respect, the mean figure of soil mites under the nodulated plants exceeded that of the non-nodulated (655.56 - 536.11). The maximum density of soil mites recorded under the nodulated plants fertilized by 30 kg/f. (1013.89 & 936.11).

Table (1): Population density of the red spider mite *Tetranychus cucurbitacearum* (Sayed) on soybean leaves as affected by nodulation and nitrogen fertilization

Treatments	Mean number of moving stages on 5 leaflets						
	35	42	49	56	63	70	Mean
A							
A_1	13.9	37.5	119.7	153.7	137.1	17.6	79.9
A_2	17.1	44.3	139.6	172.9	154.4	20.8	91.5
F. test	**	**	**	**	**	**	
B							
b_1	10.3	16.8	76.5	108.0	98.7	13.8	54.0
b_2	14.7	30.7	102.7	135.5	116.8	17.7	69.7
b_3	17.8	41.5	129.3	158.8	141.2	22.0	85.1
b_4	16.0	55.3	162.5	200.3	178.0	19.2	105.2
b_5	18.5	60.3	177.3	214.0	194.2	23.2	114.6
L.S.D 5%	2.071	2.852	4.864	5.070	4.273	2.330	
A_1b_1	10	16.0	70.7	103.3	96.7	12.0	51.4
A_1b_2	13.7	26.0	89.0	123.3	113.3	16.6	63.7
A_1b_3	15	38.3	122.7	148.0	131.7	20.3	79.3
A_1b_4	14.7	52.7	155.0	194.3	157.7	17.7	98.7
A_1b_5	16	54.7	161.3	199.7	186.3	21.3	106.6
A_2b_1	10.7	17.7	82.3	112.7	100.7	15.7	56.6
A_2b_2	15.7	35.3	116.3	147.6	120.3	18.6	75.6
A_2b_3	19.7	44.7	136.0	169.7	150.6	23.6	96.6
A_2b_4	17.3	58.0	170.0	206.3	198.3	20.7	111.7
A_2b_5	22	66.0	193.3	228.3	202.0	25.3	122.8
L.S.D 5%	2.862	4.053	6.878	7.171	6.044	9.887	

A) **Unnodulated**
Az Nodulated

b] **Unfertilized**
bz Spray fertilization 15 kg
ba Spray fertilization 30 kg
b4 Ground fertilization 15 kg
b5 Ground fertilization 30 kg

Table (2) Population density of the soil mite under soybean plants as affected by nodulation and nitrogen fertilization

Treatment	Mean number of soil mites /m²												Grand mean
	After two weeks				After four weeks				After six weeks				
	Gamasida	Prostigmata	Orbatida	Acaridida	Gamasida	Prostigmata	Orbatida	Acaridida	Gamasida	Prostigmata	Orbatida	Acaridida	
A													
A_1	513.33	226.66	580.00	120.00	986.67	226.67	1253.33	193.33	1953.33	500.00	2300.00	33.33	740.55
A_2	573.33	300.00	613.33	180.00	1300.00	326.67	1366.66	226.67	2260.00	660.00	2486.67	93.33	865.56
F. test	**	**	**	**	**	**	**	**	**	**	**	**	
B													
b_1	316.66	100.00	333.33	33.33	5600.00	116.67	1000.00	83.33	1183.33	383.33	2066.67	0	934.72
b_2	416.67	150.00	483.33	83.33	6300.00	150.00	1200.00	150.00	2033.33	516.67	2266.67	0	1145.83
b_3	550.00	300.00	616.67	150.00	6700.00	250.00	1350.00	183.33	2116.67	583.33	2433.33	16.67	1270.83
b_4	650.00	350.00	733.33	233.33	7500.00	383.33	1450.00	283.33	2216.67	650.00	2550.00	116.66	1426.38
b_5	783.33	416.66	816.67	250.00	8201.00	483.33	1550.00	350.00	2383.33	766.67	2650.00	183.33	1569.44
L.S.D 5%	248.089	134.545	224.582	96.764	189.618	167.973	313.652	116.117	248.843	N.S.	N.S.	51.203	
A_1b_1	266.67	66.67	300.00	33.33	766.67	66.67	1000.00	66.67	1633.33	333.33	1900.00	0	536.11
A_1b_2	366.66	100.00	466.67	66.67	933.33	100.00	1166.67	133.33	1866.67	433.33	2166.66	0	599.99
A_1b_3	533.33	300.00	600.00	100.00	966.66	200.00	1266.67	166.67	1966.67	500.00	2366.67	0	747.22
A_1b_4	633.33	300.00	733.33	166.67	1066.66	333.33	1366.67	266.67	2033.33	566.67	2466.67	66.67	833.33
A_1b_5	766.67	366.66	800.00	233.33	1200.00	433.33	1466.67	333.33	2266.67	666.67	2600.00	100.00	936.11
A_2b_1	366.67	133.33	366.66	33.33	1100.00	166.67	1000.00	100.00	1933.33	933.33	2233.33	0	655.56
A_2b_2	466.67	200.00	500.00	100.00	1166.67	200.00	1233.33	166.67	2200.00	600.00	2366.67	0	766.67
A_2b_3	566.66	300.00	633.33	200.00	1266.67	300.00	1433.33	200.00	2266.67	666.67	2500.00	33.33	863.89
A_2b_4	666.67	400.00	733.33	300.00	1433.33	433.33	1533.33	300.00	2400.00	733.33	2633.33	166.67	977.87
A_2b_5	800.00	466.67	833.33	266.67	1533.33	533.33	1633.33	366.67	2500.00	866.67	2700.00	266.67	1013.89
L.S.D 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	72.412	

A_1 Unnodulated
A_2 Nodulated
b_1 Unfertilized
b_2 Spray fertilization 15 kg
b_3 Spray fertilization 30 kg
b_4 Ground fertilization 15 kg
b_5 Ground fertilization 30 kg

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الكثافه العدديه للحلم فى حقول فول الصويا متأثره بالتلقيح البكتيـرى و التسـميد النتروجينى

أحلام عبد السيد يونس
محطة البحوث الزراعيه بالجميزه – محافظة الغربيه

أجريت تجربه حقلية بمحطة البحوث الزراعيه بالجميزه – محافظـة الغربيـه موسـم ٢٠٠٣م تهدف الدراسة إلى تأثير التلقيح البكتيرى او عدم التلقيح لبذور فـول الصـويا بمثبـت الازوت التكافلى بالإضافة الى التسميد النيتروجينى المستخدم ، تسميد ارضى و تسـميد ورقـى (٣ رشات) بمعدلات ١٥،٣٠كجم/ف علىالكثافة العددية لكل من حلم العنكبوت الحمروحلم التربه من أربع رتب مختلفة Acaridida, Actinedida, Gammasida and Orbatida.

أوضحت النتائج أن متوسط الكثافة العددية لحلم العنكبوت الاحملا على ٥ اوراق تزداد معنويا بالتلقيح ، التسميد النيتروجينى المستخدم اما ارضيا او رشا على النبات و ذلك على مدى ٦ قياسات أسبوعية بداية من ٤٢ يوم بعد الزراعه ، وكان التسميد الارضى ٣٠ كجم /ف سبب أعلى زياده فى الكثافة العددية بينما سبب التسميد الورقى ١٥كجم/ف اقل كثافه عدديـه و ذلـك بالمقارنه بالقطع الغير معامله .

متوسـط الـكثافه الـعدديه الـكليه لحلم التربة الـتابعة لـكل مـن تحـت الرتـب Acarhdida, Actinedida, Gammasida and Oribatida تزداد بالتلقيح و التسميد و كان اكثر وضوحا مع التلقيح البكتيرى و التسميد الارضى ٣٠كجم/ف .تزداد الكثافه العدديـه لحلم التربه طبقا لنمو النباتات خلال موسم نموها .سجلت تحت رتبة Oribatida أعلى تعـداد بعد الرشة الثالثة بينما سجل أقل تعداد تحت رتبة Acarldida