

THE EFFECT OF MINERAL NUTRITION ON THE DAMAGE DEGREE OF SPRING WHEAT BY *LEMA MELANOPUS* L. (COLEOPTERA:CHRYSOMELIDAE)

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Cereal leaf beetle (*Lema melanopus* L., Coleoptera, Chrysomelidae) represent the most important pest of wheat in many countries. Larvae and adults cause damages by the feeding with leaves. Beside chemical control and the choice of resistant genotypes, and certain cultural practices can be considerably affected on the intensity of the attack and damage degree of plants. The study were carried out in Center for Small Grains during 1998-1999. The effect of mineral nutrition on damage degree of spring wheat (*Triticum aestivum* L. cv. Venera) was presented in this paper. The experiment consisted of eight treatments of mineral nutrition and control. The trial was designed as randomized block system with five replication. Damage degree of plants was recorded at the heading stage according to scale 0-5. Mineral nutrition had considerably effect on damage degree and grain yield of spring wheat plants. The lowest damage degree by cereal leaf beetle was found on the control treatment (without added mineral fertilizers). The application of N and especially NPK resulted in decreasing of resistance plants and increasing of the damage degree.

KEY WORDS: *Lema melanopus*, mineral nutrition, spring wheat.

INTRODUCTION

Small grains represent a special group of plants, which had a great economic importance. Their process of production depends on a numerous factors, among them the pest is place one of the most important. They are attacking whole plant, from root through stems, leaves, to head and grain, causing the reduction of grain yield by about 5% (ČAMPRAK, 1980).

Cereal leaf beetle (*Lema melanopus* L., Coleoptera, Chrysomelidae) represent the most important pest of wheat in many countries of the world.

Larvae and adults cause damages by the feeding with leaves.

Its appearance is regular, every year and sometime cereal leaf beetle (CLB) causing important damages in the production, decreasing grain yield by 30-50%, in extreme years by 80% (TEOFILOVIĆ, 1969). Beside chemical control and the choice of resistant genotypes, and certain cultural practices can be considerably affected on the intensity of the attack and damage degree of plants.

Earlier study showed that damage degree was the lowest at the optimal doses of NPK fertilizers as well as elevated amounts of P. At the same time, the most intensive attack of CLB appeared after application of N fertilizers (ČAMPRAK, 1979; ČIRIĆ, 1989; ČIRIĆ *et al.*, 1993). Application of K had not considerable effect on the damage degree by CLB (SIMOVA-TOŠIĆ *et al.*, 1992).

The aim of this work was the study of the effect of the mineral nutrition of spring wheat plants on the damage degree by CLB.

MATERIAL AND METHOD

The study was carried out in Center for Small Grains during 1998-1999. The effect of mineral nutrition on damage degree of spring wheat (*Triticum aestivum* L. cv. Venera) was presented in this paper. The experiment consisted of eight treatments of mineral nutrition and control. The trial was designed as randomized block system with five replications (Table I).

Table I
Amounts of imred nutrients used in the exp. (in kg/ha)

No var.	Variants of fertilization	Regular fertilization (every year)			Periodical fertilization (every fifth year)	
		nitrogen	phosphorus	potassum	phosphorus	potassium
1	O	0	0	0	0	0
2	N	120	0	0	0	0
3	NP ₂ K ₂	120	0	0	400	500
4	NP ₄ K ₂	120	0	0	800	500
5	NP ₁ K ₁	120	80	100	0	0
6	NP ₃ K ₁	120	160	100	0	0
7	NP ₂	120	0	0	400	0
8	NP ₁	120	80	0	0	0
9	NK	120	0	100	0	0

Plot area was 100 m². Nitrogen fertilizers (N) were applied as calcium-ammonium-phosphate, phosphorus as super-phosphate (P) and potassium (K) as potassium-chloride (60% K₂O). Nitrogen fertilizers were applied regularly, every year, while P and K fertilizers in certain variants was applied periodically (whole amounts every fifth year). In one of the treatments was used only N, and in other two treatments P and K was omitted. Other cultural practices were made by standard methods (JELIĆ, 1990).

Damage degree of plants was recorded at the heading stage according to scale 0-5 (STAMENKOVIĆ & PANKOVIĆ, 1991).

- (0) – Immunity (without the trace of damage)
- (1) – High resistance (damages in trace upto 5%)
- (2) – Middle resistance (damages quite poor 5-20%)
- (3) – Mild resistance (damages less than averaged, 20-40%)
- (4) – Susceptibility (damages higher than averaged, 40-75%)
- (5) – High susceptibility (damages over 75%)

RESULTS AND DISCUSSION

The lowest grain yield was obtained on control. Attack of CLB on the control was not observed. These plants was getting wooden and rough and they became very unattractive food for CLB larvae.

Nitrogen nutrition of wheat plants considerably increased grain yield. However, the attack of CLB was slightly increased. The damages were still in trace. Complete fertilization (including N, P and K) resulted in more

Table II
Damage degree of plants caused by attack of CLB

No var.	Variants of fertilization	Repetition					Average damage (0-5)
		I	II	III	IV	V	
1	O	0	0	0	1	0	0.2
2	N	0	2	0	2	1	1.0
3	NP ₂ K ₂	0	3	5	1	2	2.2
4	NP ₄ K ₂	1	4	5	4	2	3.2
5	NP ₁ K ₁	1	2	4	4	2	2.6
6	NP ₃ K ₁	1	4	5	5	4	3.8
7	NP ₂	0	1	3	2	3	1.8
8	NP ₁	0	1	2	4	2	1.8
9	NK	1	1	3	4	1	2.0

intensive growth and development of wheat plants and increasing of grain yield. These plants were characterized faster growth and development and

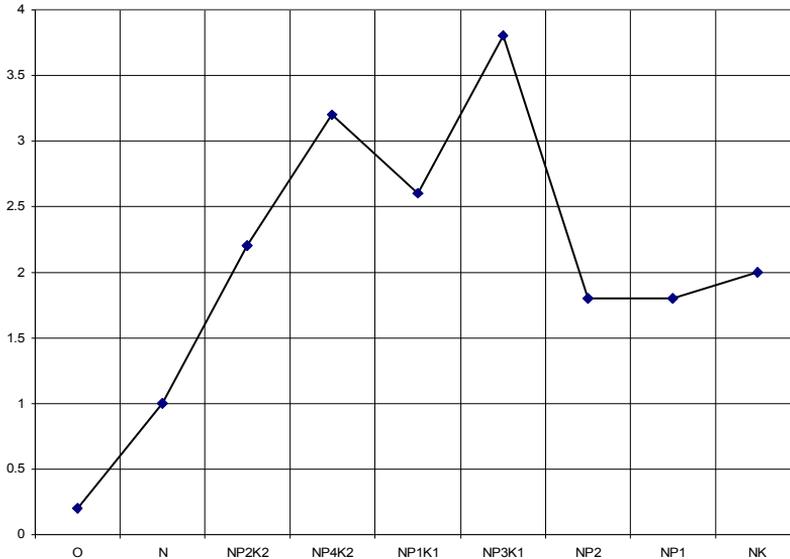


Fig. 1 Damage degree of plants caused by attack of CLB

higher turgescence in comparison with the control and N variant (Table II; Fig. 1). Hence, attack of CLB was more intensive with severe damage degree. From reported reasons, obtained results differ from earlier achieved ones (ČAMPRAĀ, 1979; ĆIRIĆ, 1989). With respect to that plants showed middle and slightly resistance against the attack of CLB, increasing of grain yield was below averaged increasing on above-mentioned fertilization variants.

Plants (NP treatments) were achieved grain yield at the same level as those (NPK treatments), but their resistance was higher and with slightly damage degree. Therefore, grain yield of these plants (NP) was higher in any case, in comparison with other plants (NPK treatments). These plants (NP) were usually achieved full maturity stage earlier and getting rough. Hence, attack of CLB was decreased.

The application of NK fertilizers resulted in considerably reduction of grain yield, compared to NPK and NP variants of fertilization (Table III; Fig. 2). Thereafter, the attack of CLB was more pronounced compared to NP variant. It resulted in great damage degree and decreasing of grain yield. It is well known that plants supplied with potassium are more turgescence

Table III
Grain yield of cv. Venera (in kg/ha)

No var.	Variants of fertilization	Repetition					Averaged grain yield
		I	II	III	IV	V	
1	O	1.100	900	900	900	900	940
2	N	2.000	1.800	1.500	1.800	1.500	1.720
3	NP ₂ K ₂	2.500	2.300	2.000	2.000	2.200	2.200
4	NP ₄ K ₂	2.700	2.200	2.200	2.400	2.040	2.308
5	NP ₁ K ₁	2.400	2.500	2.200	2.400	1.800	2.260
6	NP ₃ K ₁	2.600	2.600	2.100	2.400	2.400	2.420
7	NP ₂	2.400	2.000	2.300	1.900	2.300	2.180
8	NP ₁	2.800	2.500	2.300	2.400	1.800	2.360
9	NK	2.320	2.100	2.200	1.700	1.280	1.920

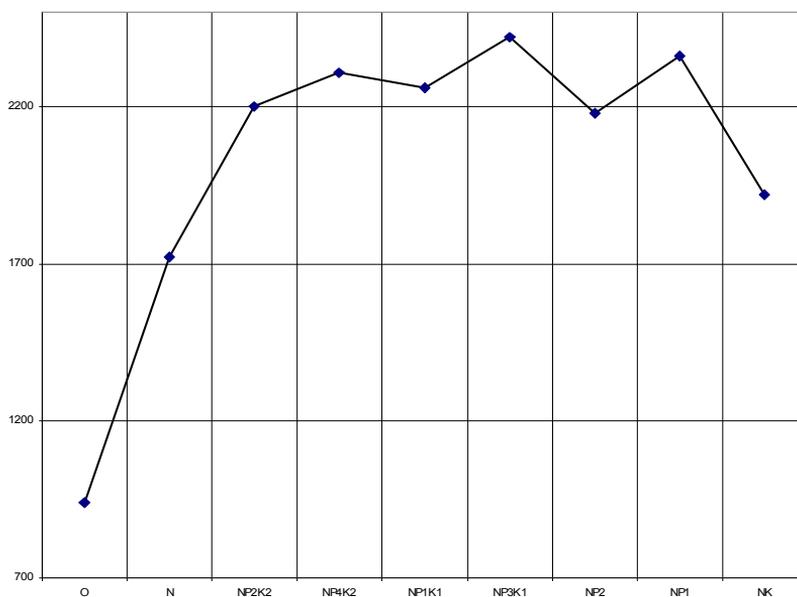


Fig. 2 Grain yield in (kg/ha) of cv. Venera

and water content in their cells is high. Therefore, attack of CLB was more intensive on this treatment.

CONCLUSION

Mineral nutrition had considerably effect on damage degree and grain yield of spring wheat plants.

The lowest damage degree by cereal leaf beetle was found on the control treatment (without added mineral fertilizers).

The application of N and especially NPK resulted in decreasing of resistance plants and increasing of the damage degree. Hence, the plants were grown at the complete nutrition (with N, P and K) were not achieved corresponding increasing of grain yield in comparison with N, NP and NK treatments.

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УТИЦАЈ МИНЕРАЛНЕ ИСХРАНЕ НА СТЕПЕН ОШТЕЋЕЊА ЈАРЕ ПШЕНИЦЕ ЖИТНОМ ПИЈАВИЦОМ

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И з в о д

Житна пијавица је најважнија штеточина стрних жита на подручју Централне Србије. Редовно се јавља, а повремено причињава и велике губитке у производњи. Осим хемијским сузбијањем и избором отпорних сорти, неким агротехничким мерама се може знатно утицати на интензитет напада и степен оштећења биљака.

Истраживање је изведено на стационарном пољском огледу Центра за стрна жита у Крагујевцу током 1998/99. године. У раду је приказан утицај минералне исхране на степен оштећења јаре пшенице Венера овом штеточином. У огледу је поред контроле (без ђубрења) било осам варијанти минералне исхране распоређених по случајном блок систему у пет понављања.

Очитавање степена оштећења биљака обављено је у фази класања, по скали од 0-5.

Минерална исхрана је имала битан утицај на степен оштећења биљака пшенице. Најмањи степен оштећења забележен је код контролних биљака, без употребе минералних ђубрива. При употреби N у исхрани, степен оштећења је имао тренд повећања. Укључивањем у исхрану P и K ђубрива, нарочито када су периодично употребљена, задржава се и даље тренд повећања оштећења. Највећи интензитет напада констатован је код варијанте NPK ђубрења у којој је примењена повећана количина P-ђубрива. Биљке пшенице код којих је примењена горе наведена варијанта исхране, имале су интензивнији раст и развиће, а самим тим и бољи хабитус, одакле проистиче закључак да су биле атрактивније за интензивнији напад посматране штеточине.

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