STUDY ON THE BIOMASS PRODUCTION OF MAIZE AND WEEDS IN FERTILIZATION FIELD EXPERIMENT

András KISMÁNYOKY – Éva LEHOCZKY

University of Veszprém, Georgikon Faculty of Agriculture, Keszthely, Hungary

Introduction

According to Győrffy (1966), the yield of maize is influenced by many other agrotechnical factors besides the ecological factors: fertilising 30%, crop density 21%, genotypes 28%, weed control 18% and any other factors in 3%. The natural soil fertility might be preserved or enhanced by mineral fertilizers and farm yard manure as well (Kismányoky 1994). The weed flora is different e.g., winter or summer sowing crop plants, row crops or cereals (Reisinger *et al.* 2003). It is difficult to demonstrate the level of weed damage of different weed species in field surveys, because of the different composition of weed flora (Reisinger 1995). The level of manuring probably has an effect on the combination of weeds, because of the different competitiveness of weeds and their reactions to the nutrient supply (Berzsenyi 2000). There are essential differences in the cover of weeds in the number of the weed species depending on the manuring system had practised (Lehoczky, Kismányoky A. 2005). The high increase of fertilizers, especially the nitrogen fertlizers, had a predominant effect on the change of the weed flora (Bachtaler 1970, Eggers 1979). The main competition between crops and weeds is the competition for water and nutrients. Nutrient supply can alter crop-weed competitive interactions markedly (Lehoczky 1995, 2002, 2004). Sufficient manuring produces powerful crop plant cover and less weediness (Kádár *et al.* 1999).

The aim of our research was to study the effect of the N dosis on weeds in a long-term fertilization field experiment. We intend to compare between the different effects of the organic and mineral fertilizers.

Material and Methods

The study was conducted in a 22 year old long-term IOSDV field experiment on the research field of the Department of Soil Management and Land Use in Keszthely, Hungary.

Tab. 1: N fertilizer treatments

Treatments	M	WW	WB
	N kg·ha^{-1}		
N_0	-	-	-
N_1	70	50	40
N_2	140	100 (50+50)	80
N_3	210	150(50+50+50)	120 (80+40)
N_4	280	200 (100+50+50)	160 (80+40+40)

The bi-factorial trial was arranged in split plot design with three replications. Size of plots: 48m^{-2} (6m x 8m). Crop rotation: maize (M) -winter wheat (WW) -winter barley (WB). Factor A: nutrients: a_1 NPK; a_2 NPK+35 t/ha FYM (worked in by plow in maize). Factor B (Tab. 1): N kg·ha^{-1} N_0-N_4, in all treatments: 100kg P_2O_5 ha^{-1} & 100kg K_2O ha^{-1}. The time of seeding was the 2nd of May. In the experiment was no weed control until sampling time, so the weediness in maize under the influence of different fertilizers (NPK, NPK+FYM) and doses of N could be studied. The weed survey was made 25 days after seeding. For the weed survey the Balázs-Ujvárosi coenological method was applied. In this time the maize was in 2-3 leaves

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stage. After the weed survey all plants of all weed species from each plot were collected. The sample area was $1m^2$. Weed plants were counted and fresh and dry matter weight of shoots was measured. Furthermore five maize plants per plot were sampled.

Results and discussion

In the NPK treatments 12 weed species were found, in the NPK+FYM treatments 11 (Tab. 2). In both treatments were average 4 weed species per plots. *LATTU* germinated only in the NPK treatments and in one control plot only. The two methods of manure treatments were significant different in weed cover and the order of dominance.

Tab. 2: Weed species registered on the experiment in the order of dominance

NPK		NPK+FYM	
No. Species	cover %	No. Species	cover %
1. *Chenopodium album* L.	5.34	1. *Abutilon theophrasti* MEDIC.	28.76
2. *Amaranthus chlorostachys* WILLD.	3.60	2. *Convolvulus arvensis* L.	7.67
3. *Convolvulus arvensis* L.	1.63	3. *Chenopodium album* L.	3.46
4. *Lathyrus tuberosus* L.	0.32	4. *Chenopodium hybridum* L.	0.81
5. *Ambrosia artemisiifolia* L.	0.29	5. *Amaranthus chlorostachys* WILLD.	0.46
6. *Abutilon theophrasti* MEDIC.	0.19	6. *Xanthium strumarium* L.	0.34
7. *Cirsium arvense* (L.) SCOP.	0.17	7. *Polygonum persicaria* L.	0.05
8. *Xanthium strumarium* L.	0.09	8. *Ambrosia artemisiifolia* L.	0.02
9. *Echinochloa crus-galli* (L.) P. B.	0.05	9. *Echinochloa crus-galli* (L.) P. B.	0.01
10. *Veronica hederifolia* L..	0.04	10. *Veronica hederifolia* L.	0.01
11. *Chenopodium hybridum* L.	0.01	11. *Cirsium arvense* (L.) SCOP.	0.01
12. *Polygonum persicaria* L.	0.01		

CHEAL and *AMACH* were found in all plots in the experiment. *CIRAR* and *ABUTH* emerged only in half of the plots. The species order of dominance in the plots of the NPK+FYM treatments was different to the NPK treatment. The average weed cover is different in the plots between the two kind of manure treatments. In the NPK+FYM plots in average 3.5 times (41.6%) were higher the weed cover than on the NPK plots (11.7%). On the effect of the N treatments the changing of weed cover produced different tendencies according to the two kind of fertilizing system. In the N_2 (140kg N/ha^{-1}) among the treatments the weed cover were higher significantly than in the control or in the N_3, N_4 plots. In the control and at the high N dosis the cover of weeds are fewer. In the N_2 treatment, *CHEAL* had the highest cover (10%), which is nitrofil. In the NPK+FYM treatment, in the control plots the weed cover were the highest, which is significant. The less weed cover was in the highest N dosis treatment (28.06%), which cover is the half of the cover of the control plots. The weed cover reduced with the increase of N dosis. Inside in all of the weed cover (28.06-55.05%) the highest cover value were measured at the *ABUTH* (22.95-39.17). We studied the biomass production of weeds and the maize, too (Tab. 3). In the NPK treatments the biomass production of maize and weeds were less, than in the NPK+FYM treatments. The dry biomass weight of maize (2-3 leaf stage) in the average of treatments in the NPK plots were 4.23 g/m^{-2}. In the NPK+FYM treatments were 5.42 g/m^{-2}. The difference is more than 30%. Between the weed biomass productions we found 3 times ammount of differences. In the NPK plots 23.00 $g/m^{-2,}$ in the NPK+FYM plots 68.15 g/m^{-2}. Weeds which consist of more weed species, reacted with higher

biomass production to the organic manure. The above mentioned phenomenon is typical in maize production regarding the weeds and the maize plant relation. In the just NPK treatments the relation of maize, the biomass changed between 12.14-22.11%. In the NPK+FYM treatments despite of the total biomass was high; the production of maize biomass was only 6.07-11.96%.

Tab. 3: The fresh and dry biomass weight of weeds and maize

N	NPK + FYM				NPK			
	Dry matter weight Fresh weight g/m^{-2}				Dry matter weight Fresh weight g/m^{-2}			
	weed	maize	weed	maize	weed	maize	weed	maize
N_0	74.37	4.81	444.41	35.57	22.71	3.75	138.54	29.98
N_1	89.61	6.02	454.21	44.40	33.72	4.66	214.79	35.49
N_2	69.12	5.03	416.74	43.69	30.76	4.95	199.92	37.40
N_3	60.31	4.84	357.28	36.72	15.11	4.29	93.57	32.67
N_4	47.38	6.44	281.18	48.04	12.70	3.52	79.67	25.11
average	*68.15*	*5.42*	*390.76*	*41.68*	*23.00*	*4.23*	*145.29*	*32.13*

In the NPK treatments the biomass production of weeds had been grown with 48 and 35% in the N_1 and N_2 treatments respectivelly. In the N_3 and N_4 treatments the biomass productions were less with 33 and 44%, than in the control plots. In case of maize we experienced fewer changing. In the N_1 treatment 24%, in the N_2 32% and in the N_3 14% more fresh weight were measured in the control plots. In the N_4 treatment it was by merely 6% fewer. In the NPK+FYM plots in relation to control the fresh weight of weeds were 20% higher in the N_1 treatment in the N_2, N_3 and N_4 the fresh weight were 7, 19, 36, % fewer respectivelly. The biomass weight of maize was almost the same compare to the control influenced by N treatments (N_2, N_3). In the N_1, N_4 treatments these were with 25 and 34% higher. In the NPK+FYM, N_4 treatments the maize biomass production was basically higher than in the control plot at the same time in the only NPK variation in the N_4 the biomass was fewer than in the control treatments.

Conclusion

In relation of NPK and NPK+FYM plots, the multiple differences in weed cover which is more than three fold could be assign to the higher organic matter of soil, and the favourable soil conditions. The organic manuring insured expecially favourable conditions for the *ABUTH.* The average weed cover of this plots were 28.76%, while on the NPK were nearly 0.19%. This weed species is get in to the experiment field some years ago, with the applied organic manure. The relation of biomass weight of maize in the all fresh weight (maize + weed), were basically higher in NPK plots, than in the NPK+FYM plots. In the high N dosis treatments (N_3, N_4) both manuring methods, the weight average of maize were higher inside the all biomass. The weight of weeds was basically fewer in the NPK treatments in an average 1/3, as in the NPK+FYM plots. The changes in the weed biomass production causes by increasing N dosis were higher in the only NPK variations as in the NPK+FYM treatments.

We can set down according to our results that on organically manured fields the weed cover of maize at early stage of growth, which is a critical period in respect of competition could be affect the following growth stages, the ear and seed developing and all of the corn production.

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