COMPETITIVENESS OF VELVETLEAF (ABUTILON THEOPHRASTI MEDIC.) AND ITALIAN COCKLEBUR (XANTHIUM ITALICUM MOR.) IN MAIZE AND SUNFLOWER

[*]Dávid I., [*]Radócz L., [**]Béres I., [**]Kazinczi G., [***]Kovács I.

[*]Debrecen University, Faculty of Agriculture, Department of Plant Protection, Debrecen
[**]Veszprém University, Georgikon Faculty of Agriculture, Plant Protection Institute, Keszthely
[***]BASF Hungaria Kft, Budapest

Abstract

Field experiments were conducted in Debrecen, Keszthely and Telekgerendás, in Hungary, in 2005 to study competitiveness of cocklebur (Xanthium strumarium L.) and velvetleaf (Abutilon theophrasti Medic.)against maize and sunflower, with full season competition.

Weed densities ranged 1 to 10 plants/ m^2 in case of both weed species.

Height of maize was reduced only in weedy control plots compared to the continously hoeing plots. Sunflower height was not reduced by any level of competition.

Yield of maize was reduced by 34% in weedy control plots and by 15% in plots which contained 1 velvetleaf/m^2 compared to hoeing plots, but there wasn't yield loss in other treatments in Keszthely.

In Debrecen, yield loss was 47% in weedy control, and velvetleaf densities of 5 and 10 plant/m^2 caused 28 and 31% yield losses.

In Telekgerendás, cocklebur reduced yield of maize by 62 and 64% at density of 5 and 10/m^2, and there was 83% yield loss in weedy control.

In Debrecen, yield losses of sunflower were 34% and 37% in weedy control and in plots containing 10 velvetleaf/m^2, respectively, but velvetleaf densities ranging from 1 to 5 plants/m^2 didn't cause reduction in the seed yield.

In Telekgerendás, yield loss of sunflower was 44% in weedy control, and cockleburs reduced yield by 18, 29, 41, 56% depending on density.

Yield of plots which were weeded only once at 3-4 or 6-7 leaves stage in case of maize, and at 4 or 8 leaves stage in case of sunflower didn't differ significantly from weed-free control.

Key words: Abutilon, theophrasti, Xanthium italicum, maize, sunflower

INTRODUCTION

Maize and sunflower are most important row crops in Hungary. There are several methods to control weeds of them, but these methods are needed to modify because of change of weed associations and others reasons. Some spreadig weed species (velvetleaf, cocklebur, ragweed etc.) have become dominant species of weed assocoations of these crops, so they are primary target of weed control nowadays. Changes of weed assocoations are induced partly by cropping systems (tillage, weed control methods, nutrition, etc.). These systems are suitable for some species, which can propagate and spread, and ohter weeds are pushed into background (Bene and Radócz 2003, Farkasné 2003, Dorner et al. 2003).

Other groups of reasons are independent from cropping systems, eg. extention of frost-free period, which can promote spreading of some noxious weeds. (Szőke 2001).

Velvetleaf and cockleburs were scattered weeds 30-40 years ago, but they became dominant weeds of row crops in Hungary. Velvetleaf wasn't found on arable land at the time of first and second survey of weeds of Hungary (1950-52 and 1969-71), but it was in the 24 state at the time of fourth survey (1996-97) (Szőke 2001; Solymosi 2005).

Italian cocklebur wasn't listed at the time of first survey, and it was only in the 257 state in 15 years, common cocklebur was in the 130 state in the fifties, but they were the 28th and 14th most troublesome weeds in Hungary at the time of fourth survey (Szőke 2001; Solymosi 2005).

MATERIALS AND METHODS

Field experiments were conducted in Debrecen, Keszthely and Telekgerendás, in 2005 to study competitiveness of cocklebur (*Xanthium strumarium* L.) and velvetleaf (*Abutilon theophrasti* Medic.)against maize and sunflower, with full season competition. Competitiveness of velvetleaf was studied in Debrecen (in maize and sunflower) and in Keszthely (in maize), competitiveness of cocklebur was studied in Telekgerendás (in maize and sunflower). Competition were examined on 25-33 m^2 plots, in three replications. Treatments are listed in *Table 1, 2*.

Table 1

Treatments in maize

1.	weed-free control (hoeing during the all season)
2.	weedy control
3.	hoeing at 3-4 leaves stage of maize
4.	hoeing at 6-7 leaves stage of maize
5.	1 velvetleaf/m^2
6.	2 velvetleaf/m^2
7.	5 velvetleaf/m^2
8.	10 velvetleaf/m^2

Table 2

Treatments in sunflower

1.	weed-free control (hoeing during the all season)
2.	weedy control
3.	hoeing at 4 leaves stage of sunflower
4.	hoeing at 8 leaves stage of sunflower
5.	1 velvetleaf or cocklebur/m^2
6.	2 velvetleaf or cocklebur/m^2
7.	5 velvetleaf or cocklebur/m^2
8.	10 velvetleaf or cocklebur/m^2

Height and yield of crops were measured, and compared.

RESULTS

Water supply is a significant factor, which can modify competition. Copious rainfall fell on the three experimental areas, therefore plant were supplied with water suitably (*Figure 1*).

Cocklebur caused more yield loss than velvetleaf in case of both crops.

Height of maize was reduced only in weedy control plots compared to the continously hoeing plots (*Figure 2*). Sunflower height was not reduced by any level of competition (*Figure 3*).

Yield of maize was decreased by 34% in weedy control plots and by 15% in plots which contained 1 velvetleaf/m^2 compared to weed-free control, but there wasn't yield loss in other treatments in Keszthely.

In Debrecen, yield loss was 47% in weedy control, and velvetleaf densities of 5 and 10 plant/m^2 caused 28 and 31% yield losses.

In Telekgerendás, cocklebur reduced yield by 62 and 64% at density of 5 and 10/m^2, and there was 83% yield loss in weedy control (*Figure 2*).

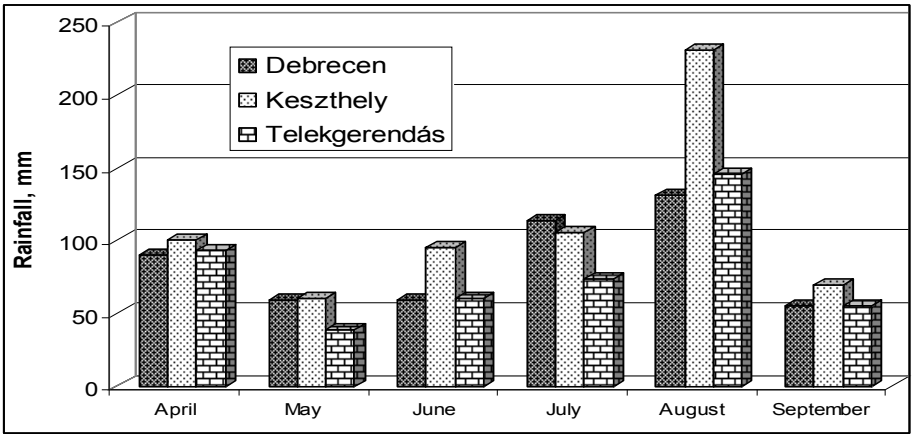

Figure 1. Precipitation on experimental areas

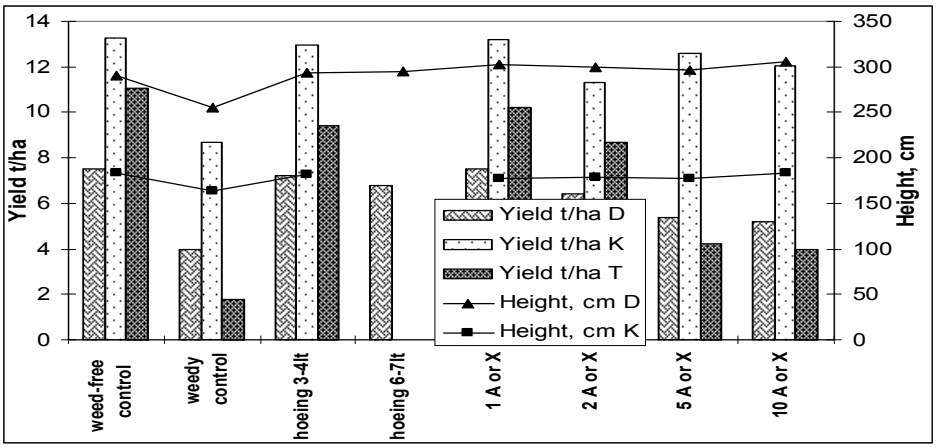

Figure 2. Height and yield of maize competiting with velvetleaf (in Debrecen and Keszthely) and cocklebur (in Telekgerendás)
D-Debrecen, K-Keszthely, T-Telekgerendás, A-velvetleaf, X-cocklebur, lt-leaves stage

In Debrecen, yield losses of sunflower were 34% and 37% in weedy control and in plots containing 10 velvetleaf/m^2, respectively, but velvetleaf densities ranging from 1 to 5 plants/m^2 didn't cause reduction in the seed yield (*Figure 3*).

In Telekgerendás, yield loss of sunflower was 44% in weedy control, and cockleburs reduced yield by 18, 29, 41, 56% depending on density (1, 2, 5, 10 plant(s)/m^2).

Yield of plots which were weeded only once at 3-4 or 6-7 leaves stage in case of maize, and 4 or 8 leaves stage in case of sunflower didn't differ significantly from weed-free control (*Figure 2, 3*).

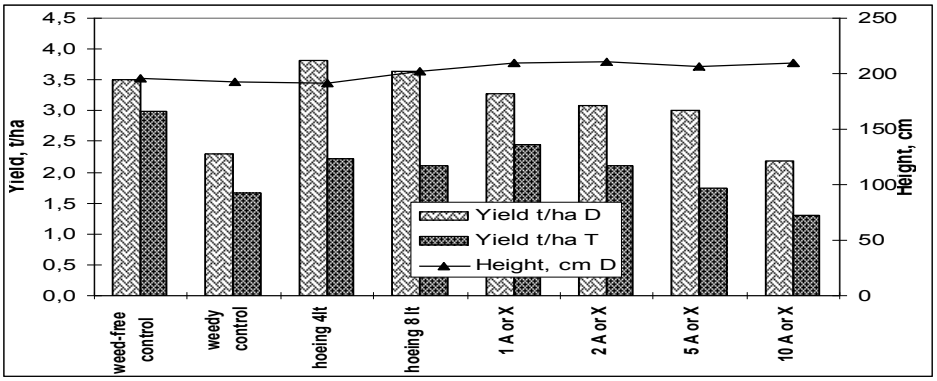

Figure 3. Height and yield of sunflower competiting with velvetleaf (in Debrecen) and cocklebur (in Telekgerendás)
D-Debrecen, T-Telekgerendás, A-velvetleaf, X-cocklebur, lt-leaves stage

DISCUSSIONS

In our experiments velvetleaf and cocklebur caused yield reduction of sunflower and maize at density ranging 1 to 10, in spite of optimal weather conditions, in 2005. Competitiveness of these weeds requires control of them in case of low density populations, as well.

REFERENCES

1. Bene S. and Radócz L., 2003, Changes of weed associations under consevation soil tillage technologies. Analale Universitatii Din Oradea, Fascicula protectia Mediului 8, 73-80.
2. Dorner Z., Blaskó D. and Németh I., 2003, Kalászos kultúrák gyomnövényzete herbicidmentes művelés esetén. Növényvédelem 39, 607-612.
3. Farkasné Sz. A., 2003, A parlagfű (*Ambrosia artemisiifolia* L.) jelenléte és borítási százalékának változása különböző művelési eljárások hatására. Növényvédelem 39, 303-311.
4. Solymosi P., 2005, Az éghajlat változásának hatása a gyomflórára a hazai kutatások tükrében, az 1969 és 2004 közötti időszakban. Növényvédelem 41. 13-24.
5. Szőke L., 2001, A melegigényes gyomfajok gyors terjedése és a klímaváltozás összefüggése. Növényvédelem 37, 10-12.