



Germination characteristics of common lamb's-quarters (*Chenopodium album* L.)

ISTVÁN SZÁRNYAS – IMRE BÉRES

University of Veszprém, Georgikon Faculty of Agricultural Sciences, Keszthely

SUMMARY

Chenopodium album is a summer annual weed occurring in disturbed habitats. In field conditions we studied the seasonal pattern and depth distribution of germination of common lamb's-quarters. We found that the main germination period is in spring, April and May. We observed that germination was low in summer, but it was continuous until the first frost. We could observe a second smaller germination peak in autumn.

In the frame of our work 500 common lamb's-quarters seedlings were dug out to find depth of germination in field conditions. Mean of germination depth was 1.79 cm. Seeds of common lamb's-quarters were unable to emerge from a depth under 4 cm.

Keywords: common lamb's-quarters, depth of germination, seasonal pattern, field conditions.

INTRODUCTION

In Hungary common lamb's-quarters was found a dominant weed in croplands. It has been ranked third in 1950, third in 1970, second in 1988, fourth in 1997 in abundance surveying croplands through Hungary, *Database of Weed Survey*, (1997). Hunyadi (1988) determined, that *Chenopodium album* has two germination peaks in a year (late spring and early autumn), of which the main peak was observed in spring. Czímber (1993 a, b, c) carried out surveys in 1990 and 1991 in large-scale carrot stands, in sugarbeet stands and maize fields in the Szigetköz area. In maize fields *Chenopodium album* was found first, in sugarbeet stands first and in large-scale carrot stands third in abundance in 1991. Seeds of *Chenopodium album* are also considerable components of the soil seed bank of cultivated lands (Fekete 1975, Hunyadi and Pathy 1976).

Chenopodium album is a summer annual weed occurring in disturbed habitats ranked amongst the 10 most important weeds of cropland in Saskatchewan, Thomas (1977). Light to heavy concentrations of *Chenopodium album* were found by Alex (1966) throughout agricultural areas of the Prairie Provinces during surveys in 1963–1964.

Of the 103 weedy species surveyed in southern Ontario, *Alex* (1964) determined that common lamb's-quarters ranked second in abundance in 50 tomato fields sampled in the counties of Essex, Kent and Prince Edward. On a world basis, according to *Holm et al.* (1977), common lamb's-quarters is ranked as the most important weed in potatoes and sugar beets and seventh in abundance in corn crops. They also state that in England *Chenopodium* seeds constitute 1/3 of the weed seed impurities of carrot seed. It was found to be the dominant weed in kale plantings in England, *Holmes and Pfeffer* (1964). In the United States, *Welker* (1966) considered common lamb's-quarters to be a primary weed in asparagus plantings. *Wisk and Colé* (1966) regard it to be the predominant weed in soybeans. The most common weed of sugar beet and potatoes in Sweden is considered to be common lamb's-quarters, *Aamissepp* (1976). *Chenopodium album* has been found to be poisonous to sheep and swine when they ingest large quantities over a sufficient period. In Iowa, *Buck et al.* (1966) attributed a seasonal disease of swine, perirenal edema, to the ingestion of *Chenopodium album*. In the Netherlands *Herweijer and Den Houter* (1970), determined that poisoning of sheep occurred after they were put in a re-sown pasture dominated by common lamb's-quarters. Our aim was to examine in field conditions the seasonal germination of lamb's-quarters through 1998, 1999 and depth of germination.

MATERIALS AND METHODS

Germination of common lamb's-quarters were examined during field surveys in county Vas, Hungary. Field examinations lasted for two years, in 1998 and 1999. We indicated eight examination areas (1 metre by 1 metre) in cropland at the same place in both experimental years

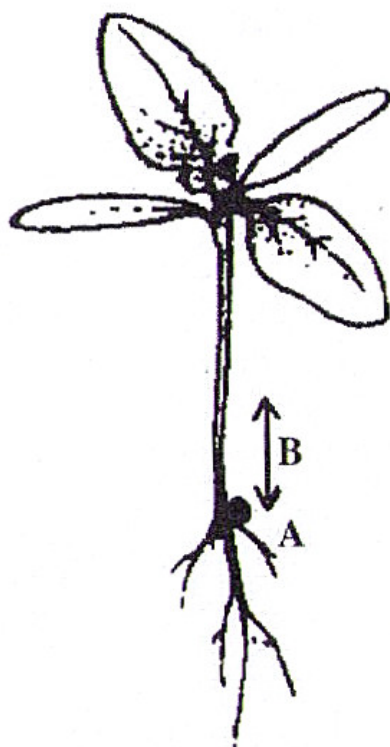
Table 1. Data of precipitation and average air-temperature

Months	Precipitation (mm)		Air-temperature (°C)	
	1998	1999	1998	1999
March	55.0	21.4	4.6	8.2
April	55.0	76.0	9.7	10.0
May	87.7	83.3	14.9	14.7
June	169.0	97.4	18.1	18.5
July	117.7	97.1	20.2	22.3
August	103.5	176.3	19.8	21.6
September	170.9	76.6	14.5	17.2
October	105.0	120.4	9.4	7.9
November	48.2	74.2	4.6	6.0
Total	912.0	822.7	—	—
Average	—	—	12.86	14.04

(type of soil: Ramann's brown forest soil, pH: 6.45, humus: 1.3%) without any weed control. From first of March to thirteenth of November germination seedlings of common lamb's-quarters were counted then removed in ten day intervals. Germination individuals of other species were also removed to reduce competition among seedlings. After vegetation period a ploughing cultivation was applied. In the frame of our work we also studied the depth of germination of common lamb's-quarters. In May, 1997, we dug out 500 common lamb's-quarters seedlings in Csepreg area. Pieces of soil were carefully removed, then the distance between seed coat and hypocotyl above the ground was measured to one millimeter accuracy. This distance (*Figure 1.*) was considered depth of germination after *Koch* (1969).

Figure 1. Depth of germination of common lamb's-quarters

A seed coat
B depth of germination



We also gathered data (*Table 1.*) about soil temperature at a depth of 5 cm, precipitation and air-temperature (local meteorological station, Csepreg) during the vegetation period of 1998 and 1999.

RESULTS AND DISCUSSION

Seedlings were first observed at the end of March in both experimental years.

Germination continuously increased until the end of May. Emergence of common lamb's-quarters seedlings was high in April and May. The observed maximum numbers of seedlings were 70 and 51 in a squaremetre, in 1998 and 1999, respectively. As soil and air temperature increased (*Table 1.*), we found more seedlings until the end of May. Common lamb's-quarters showed low germination in summer and autumn, but it continued until the first frost. There was a second germination peak in early autumn, but it was much smaller than in spring (*Figure 2.* and *3.*). Regarding yearly pattern

of emergence our field observations on common lamb's-quarters are consistent with the results of earlier investigators (*Williams* 1963, *Roberts* 1964, *Hunyadi* 1988).

We found that seeds of common lamb's-quarters can germinate from soil layers between 0–4 cm. Most seedlings emerge from a range of 1–2.5 cm (*Figure 4.*). We found no considerable germination of common lamb's-quarters under 4 cm in field conditions, though seeds were likely present in deeper soil layers, due to seed bank inversion caused by cultivation (*Csontos* 1997). Mean of germination depth was 1.79 cm. In field trials *Kazinczi et al.* (1997) also confirmed that maximum depth of germination of common lamb's-quarters is around 5 cm depending on soil type. Sandy soils allow deeper germination than loamy ones.

Figure 2. Germination of common lamb's-quarters in agricultural fields near Csepreg, county Vas, in 1998

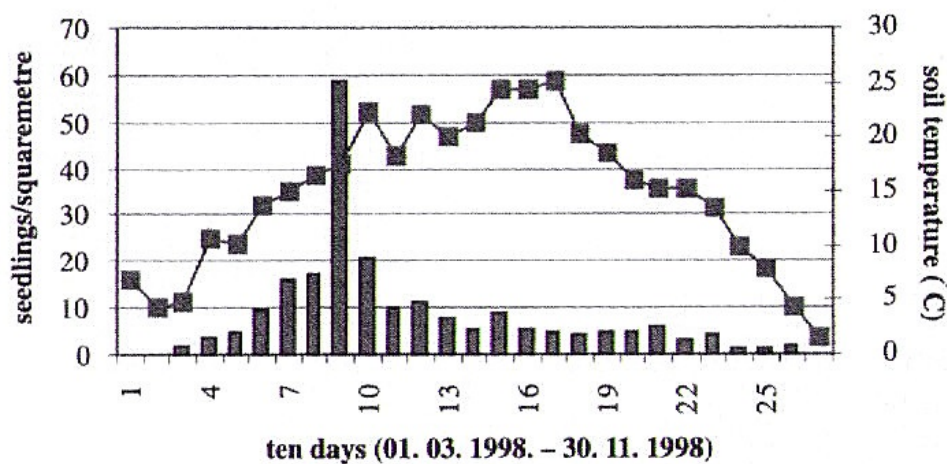


Figure 3. Germination of common lamb's-quarters in agricultural fields near Csepreg, county Vas, in 1999

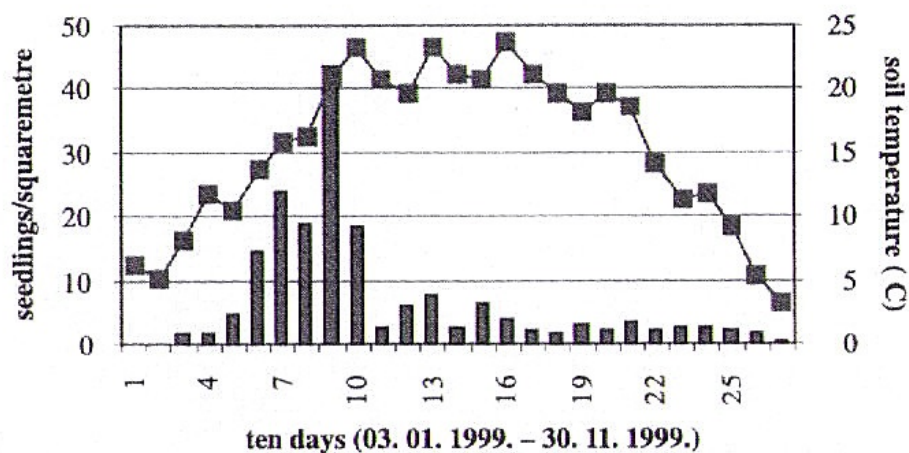
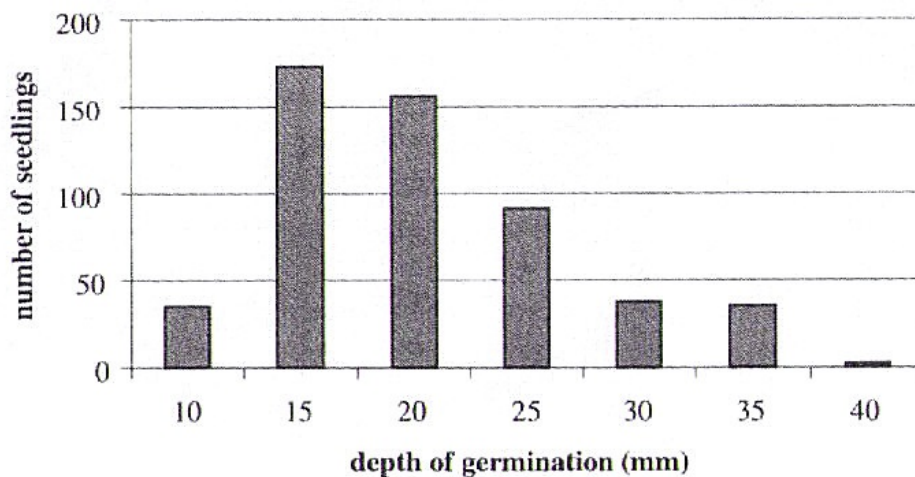


Figure 4. Depth of germination of common lamb's-quarters (n = 500)



Adatok a fehér libatop (*Chenopodium album* L.) csírázási tulajdonságainak ismeretéhez

SZÁRNYAS ISTVÁN – BÉRES IMRE

Veszprémi Egyetem, Georgikon Mezőgazdaságtudományi Kar, Keszthely

ÖSSZEFOGLALÁS

A fehér libatop (*Chenopodium album* L.) nyári egyéves gyomnövény, mely elsősorban bolygatott talajú élőhelyeken fordul elő. Szántóföldi körülmények között megvizsgáltuk a fehér libatop éves csírázási ritmusát és csírázási mélységét. Megállapítottuk, hogy a fehér libatop fő csírázási időszaka tavasszal, áprilisban és májusban van. Megfigyeléseink alapján megállapítottuk, hogy nyáron a csírázás mértéke kicsi, de folyamatosan megtalálhatóak a csírázó növények egészen az első fagyokig. Kora ősszel egy második, a tavaszinál lényegesen kisebb csírázási csúcs figyelhető meg. Vizsgálataink során 500 db szikleveles fehér libatop csíranövénykét ástunk ki a talajból, hogy meghatározzuk a kelési (csírázási) mélységet szántóföldi körülmények között. Megállapítottuk, hogy a csírázási mélység átlaga 1,79 cm. Eredményeink alapján megállapítható, hogy a fehér libatop magvai 4 cm-nél nagyobb talajmélységből nem képesek kicsírázni.

Kulcsszavak: fehér libatop, csírázási mélység, periodicitás, szántóföldi körülmények.

REFERENCES

- Aamissepp, A. (1976): Weed control in potatoes and sugar beet. Swed. Weed Conf. (SWDCA) 17, D-30, D-32.
- Alex, J. F. (1964): Weeds of tomato and corn fields in two regions of Ontario. Weed Res. 4, 308-318.
- Alex, J. F. (1966): Survey of weeds of cultivated land in the prairie provinces. Exp. Farm, Res. Br., Agric. Can. Regina, Sask. Mimeo. pp. 68.
- Buck, W. M. – Preston, K. S. – Abel, M. – Marshall, M. S. (1966): Perirenal edema in swine: a disease caused by common weeds. Amer. Vet. Med. Assoc. J. 148, 1525-1531.
- Czímber Gy. (1993a): A Szigetköz nagyüzemi sárgarépvetéseinek gyomnövényzete. Növényvédelem 29, (1-2) 29-34.
- Czímber Gy. (1993b): Északnyugat-Magyarország szeptális gyomvegetációja. III. A Szigetköz cukorrépvetéseinek gyomnövényzete. Növénytermelés 42, (5) 409-418.
- Czímber Gy. (1993c): Északnyugat-Magyarország szeptális gyomvegetációja. II. A Szigetköz kukoricavetéseinek gyomnövényzete. Növénytermelés 42, (3) 241-252.
- Csontos P. (1997): A magbank ökológiai alapjai: definíciók és mintavételi kérdések. Természetvédelmi Közlemények (5-6) 17-26.
- Database of Weed Survey, Hungary, Budapest (1997).
- Fekete, R. (1975): Comparative weed-investigations in traditionally-cultivated and chemically-treated wheat and maize crops. IV. Study of the weed-seed content of the soils of maize crops. Acta Biologica Szeged 21, (1-4) 9-20.

- Herweijer, C. H. – Den Houter, L. F. (1970): Poisoning in sheep caused by *Chenopodium album*. Tijdschr. Diergeneesk 95, 1134–1136.
- Holmes, H. M. – Pfeiffer, R. K. (1964): The control of *Chenopodium album* in kale with a methylmercaptotriazine (desmetryne). Pest. Abstr. News Sum. Sect. C. 10, 159–163.
- Holm, L. G. – Plucknett, D. L. – Pancho, J. V. – Herberger, J. P. (1977): The world's worst weeds. East-West Center Book, Univ. Press of Hawaii, Honolulu, Hawaii pp. 609.
- Hunyadi K. (1988): Szántóföldi gyomnövények és biológiájuk. Mezőgazdasági Kiadó, Budapest.
- Hunyadi K. – Pathy Zs. (1976): Keszthely környéki rétláp talajok gyommag-fertőzöttsége. Növényvédelem 12, (9) 391–396.
- Kazinczi G. – Hunyadi K. – Matók I. (1997): Fehér libatop (*Chenopodium album*). Agrofórum 8, (8) 41–45.
- Koch, W. (1969): Zur Lebensdauer von Unkrautsamen. Saatgut-Wirtschaft, Stuttgart 20, (8) 251–253.
- Roberts, H. A. (1964): Emergence and longevity in cultivated soil of seeds of some annual weeds. Weed Res. 4, 296–307.
- Thomas, A. G. (1977): Weed survey of cultivated land in Saskatchewan. Agric. Can. Res. Sta. Regina, Sask. Mimeo. pp. 103
- Welker, W. V. (1966): Weed control in asparagus. Northeast. Weed Conf. Proc. 20th Annual Meeting p. 35.
- Williams, J. T. (1963): Biological flora of the British Isles: *Chenopodium album* L. Journal of Ecology, 51 (3) 711–725.
- Wisk, E. L. – Colé, R. H. (1966): Effect of date of application of two pre-plant herbicides on weed control and crop injury in soybeans. Northeast. Weed. Conf. Proc. 21st Annual Meeting pp. 366–367.

A szerzők levélcíme – Address of the authors:

SZÁRNYAS István – BÉRES Imre
Veszprémi Egyetem, Geörgikon Mezőgazdaságtudományi Kar
Növényvédelmi Intézet, Herbológiai Tanszék
H-8360 Keszthely
Deák Ferenc u. 57.