CULTURAL CONTROL OF LAMBSQUARTERS FOR ORGANIC VEGETABLE IN CANADA

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Introduction

Chenopodium album L. (Lambsquarters)
Also know as: white goosefoot, pigweed, fat hen (Royer,1999).

Lambsquarters is considered "one of the most widely distributed species of weeds in the world and is one of the most successful colonizers as it moves into new areas" (Holm et al.,1977). It competes with more than 40 crop species worldwide and is considered a primary agricultural weed in many North American crops including corn and soybeans (1977). In pastureland lambsquarters can be poisonous to sheep and swine if consumed in large amounts and over extended periods of time (Bassett and Crompton, 1978). When eaten in more moderate amounts, lambsquarters is considered highly nutrious for animals humans alike and is often eaten in salad or as cooked greens (Frick ,2010). Lambsquarters seeds can also be milled into a fine flour similar to amaranth and are an important source of food for many species of North American birds and (Bassett and Crompton, 1978)

Identification

"As a seedling, common lambsquarters has two long, linear-shaped cotyledons, with the first ovate-shaped true leaves appearing opposite in arrangement. True leaves eventually become more distinctly alternate and may be purplish on the underside with both surfaces covered with white granules or a mealy substance…More mature plants have broadly triangle- shaped leaves with irregular, shallow-toothed margins. The stems can be green or reddish, are grooved, and can be smooth or hairless" (Curran, 2010). Flowers form as green or gray-green and clusters at the tips of stems and branches. At maturity, plants can range in height from 5cm to 1.5 meters (Bassett and Crompton,1978)

Bill Summers. USDA SCS. 1989. *Midwest wetland flora: Field office illustrated guide to plant species*. Midwest National Technical Center, Lincoln. Courtesy of USDA NRCS Wetland Science Institute

Adaptation

Lambsquarters is an annual that occurs in habitats that have been recently disturbed such as agricultural fields, construction sites and gravel pits. It is not usually found in natural

situations such as woodlands or praries (Bassett and Crompton, 1978). Lambsquarters has perfect flowers and has no obvious method of seed dispersal other than sheer volume of its seed production (Curran, 2010). The average lambsquarter plant produces 72 450 seeds, and these seeds can remain viable for 21-40 years (BC ministry of agriculture and lands, 2010).

Methods of Cultural Control

In cultivated fields, the emergence of lambsquarters peaks in early spring with over 50% of the seasons emergence occuring within the month of May (Leibman, 2001, p48). The germination of lambsquarters seeds are also triggered by 3 tillage related cues: 1) *exposure to light* (Taylorson and Borthwick, 1969) *increased nitrate concentrations* (Liebman, 2001, p 50) *and temperature fluctuations* (Henson, 1970). Based on these findings, the following cultural control methods are recommended in order of most to least effective:

Adjusting the time of planting around periods of peak emergence

To minimize competition from lambsquarters during peak emergernce, the time of crop planting can be adjusted so that the crop either (i) emerges before the weed or (ii) is planted after the weed has been killed by seedbed preparation (Liebman, 2010, p. 52). One danger of planting prior to peak emergence is that the growing conditions during this time of year are not often favorable for rapid crop growth and lambsquarters, which has a high relative growth rate (Siebert and Pearce, 1993), may quickly catch up to the crop. Because seedbed preparation via tillage is likely to trigger a flush of lambsquarters, following seedbed prepartion with shallow stale seedbedding can be used to kill off the flush of weeds without triggering the germination of more lambsquarters seeds prior planting.

Use of winter cover cropping and perennials

Because lambsquarters is well adapted to the regimes of soil disturbances used for annual crops, incorporating the use of winter cover crops or perenial crops into a crop rotation will disrupt lambsquarters annual life cycle and greatly inhibit emergence in spring (online class notes). Lambsquarters plants that do emerge in a cover crop or forage can easily be killed of by mowing or grazing (Bassett and Crompton,1978).

Green manuring

Dyck, Liebman and Erich conducted trials in which lambsquarters and sweet corn were grown in competition in 2 separate plots that recived equivalent amounts of nitrogen supplied either by: 1) ammonium nitrate or 2) a crimson clover plow down (1995). In the plot fertilized with ammonium nitrate, biomass of the lambsquarters was 39% greater and the biomass of the corn was 20% lower than in the plot which received the clover plow down. Dyck, Liebman and Erich have attributed this finding to 2 reasons: 1) Lower levels of nitrates being available earlier on in the growing season when theywould

provide extra benefits to the weeds but not the crop and 2) Phyto-toxic effects of clover residue on weeds.

Adjusting plant spacing and arrangement

The germination of lambsquarters is inhibited by a low red/far ratio of light - such as the light filtered through a green leaf (Taylorson and Borthwick, 1969). Therefore, crop planting distances and spatial arrangement can be adjusted so that the crop canopy closes quickly, thereby suppressing existing weeds while inhibiting further germination.

Summary

Lambsquarters is a widespread weed that is competitive with many agricultural crops grown in Canada. Fortunately, knowledge of lambsquarters life cycle, habitat adaptation, periods of peak emergence, and germination triggers allow for the development of cultural control strategies that minimize lambsquarters ability to compete with crops and reproduce within agricultural systems.

References

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