

# Use of Domestic Geese to Control Weeds for Agriculture and Forestry Applications in Alaska

Tricia Wurtz (Research & Education Grant)

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**Title:** Use of Domestic Geese to Control Weeds for Agriculture and Forestry Applications in Alaska

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The geese remained healthy, although mildly hungry, during the study.



Protective wire was placed around white spruce seedlings to prevent trampling.

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## Situation

Weed control, a major problem and expense for Alaska farmers and nursery operators, is typically done with hand weeding or herbicides. However, chemicals may break down slowly in cold soils at northern latitudes, inhibiting crop growth in subsequent years and increasing the risk of chemicals leaching into groundwater.

A potential alternative is geese, voracious herbivores that prefer many plant species that are also noxious weeds. Their use for weeding is not new: In the 1940s, before development of organic herbicides, 200,000 geese controlled weeds in cotton in the San Joaquin Valley of California. Geese have also been used for weeding in berries, potatoes, carrots, onions, mint and Christmas trees.

By releasing geese into fields of crops they find unpalatable, domestic geese may provide effective, economical and ecologically sound weed control.

## Objectives:

1. Determine whether geese effectively control common agricultural weeds without damaging crops
2. Compare cost and efficacy of four methods of weed control
3. Determine the impact of weeder geese on soil chemistry



The geese found grasses to be highly palatable.



Covered holding pens (in blue) provide protection at night from predators.

## Actions

Four methods of weed control were conducted at the University of Alaska Fairbanks Agriculture and Forestry Experiment Station Farm on Tanana silt loam soil growing young white spruce seedlings:

1. geese only
2. geese with supplemental hand control of unpalatable weed species
3. the herbicide hexazinone
4. hand control

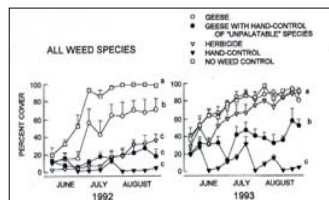
The experimental design was a randomized complete block with four blocks each containing five treatments (the four above and one control).

Twelve white China goslings, fed poultry starter and flats of greenhouse-grown weeds (which they readily consumed), were separated at 5-6 weeks into four groups of three birds and released into field plots as weather permitted (June 12 in 1992 and May 26 in 1993).

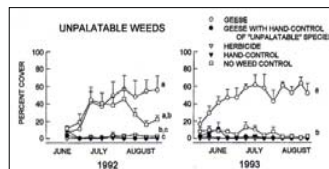
The birds were moved into treatment plots based on % cover of palatable weed species, as determined by weekly evaluations, the idea being to mimic potential operational conditions.

Measurements were made on:

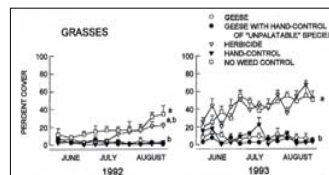
- Height and basal diameter of each white spruce (crop) seedling at the beginning and end of the season
- Total weed cover, grass cover and unpalatable weed species cover
- Soil chemistry and compaction



Estimated percent cover of all weed species over the two growing seasons of the study.



Estimated percent cover of weed species defined as "unpalatable" over the two growing seasons.



Estimated percent cover of grass over the two growing seasons.

## Results:

### Spruce seedling growth

Seedling mortality in plots with geese was high in 1992, mostly from trampling, but was lower in 1993.

Tree diameter growth of surviving seedlings was improved for all four plots in 1992 compared with the no weed control. In 1993, only hand weeding significantly improved diameter. Relative height growth did not differ between any of the treatments.

### Weed populations

In 1992, all four weed-control treatments significantly reduced total weed cover compared with no weed control. However, there were striking differences in the level of control for two groups of weed species: grasses and unpalatable weeds.

Grass was highly palatable to the geese. Grasses were effectively controlled during both years in treatments involving geese, while plots with no weed control reached 35% grass cover by the end of 1992 and 50% by the end of 1993.

Unpalatable species (pineapple weed, wild chamomile and prostrate knotweed) had a weed intensity index in 1992 that was 37% higher than plots with no weed control, a trend that became statistically significant in 1993.

The herbicide treatment was effective against unpalatable species, but not against grass.

### Soil nutrients and compaction

The geese produced a substantial amount of feces, but there was no difference in soil chemistry or in soil bulk density between goose-weeded plots and plots receiving no weed control at either the 5 or 20 cm depths.



Even though the geese deposited a large amount of feces on the site, there were no significant differences in soil N levels soil chemistry or bulk density.

## Impacts or Benefits on Agriculture

In the two-year study, weeds occurring in plots weeded by geese shifted significantly toward species the geese found unpalatable. If geese are to be used, it is advised that they be combined with another method of weed control. Using geese is thus likely to reduce the use of herbicides rather than replace them.

Trampling of the crop plants by geese was a significant cause of mortality during the first year of this study. The challenges inherent in using geese to control weeds are significant: time and expense to manage and protect the flock; protecting the crop from trampling; and the need for supplemental weed control. Whether the amount of herbicide displaced justifies those challenges will vary by crop, weeds and the amount of kind of herbicide needed.