

Corn Under Plastic

Crop Management

Objective: an informational factsheet on growing crops under plastic



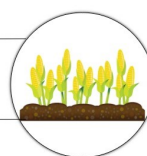
A cropping system that plants field corn under a biodegradable plastic to improve growing conditions for the crop early on in the growing season

What is it?

Most of the corn grown in northern climates is used primarily for forage due to a short growing season. In Northern Ontario, growth of corn is limited by the low corn heat units (CHU) or the amount of heat accumulated over the summer. One method to increase the length of the growing season is to use a plastic film that creates greenhouse conditions on a field scale (Figure 1). While this has been used to speed up the days to maturity in sweet corn, this technology has recently been transferred to field corn. One of the more popular methods is by using a SAMCO planter, originally from Ireland. The SAMCO planter plants the seed, sprays a herbicide and covers the row with a photo-biodegradable plastic that disintegrates over the growing season.



Figure 1: Freshly planted field corn in Earleton Ont.



Why should it be used?

First introduced to Newfoundland in the early 2000s, higher corn yields were achieved in a short growing season on the limited agricultural land available and decreased feed imports for cattle.

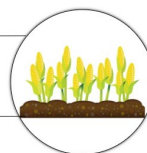
- Corn grown under the plastic mulch gives more heat to the air, soil and seed in cooler spring.
- By creating this microclimate with the plastic, there is increased emergence, less days to emergence and days to silking, and higher yields of the whole plant and the grain (Kwabiah 2003).
- Yield of the grain could see increases up to 24% (Zhang *et al* 2011).
- Quality of the grain increases, with starch content increasing on average of 36% (Farrell and Gilliland 2011).
- While earlier plastics were not as degradable, newer technology has improved so no visible plastic can be seen at the end of the growing season.



This field was planted at the same time, same conditions.
The corn on the right side lost its plastic shortly after planting and is fairly behind in development.

Both planted same day, same conditions.
Left plant was not under plastic, while the right plant was under plastic.

With the proper conditions, corn under plastic has faster rates of development in the spring, giving the corn better chances of proper maturity and higher quality.



Views from the Field

Growers see more mature, drier corn in the fall. With very little impacts due to frost. The plants seem to be able to grow better when faced with challenging conditions such as constant rain or cold.

The corn variety planted by this method should still be in the appropriate heat units for the region and seeded at a slightly higher plant population, usually around 36000 to 38000 plants per acre.

Purchase of equipment, including the plastic, has a high cost. The planting time is slower (around 7.5 acres per hour) and an extra person is needed to help with the equipment.

There is a need to plant as early as field conditions allow to plant to take advantage of the system and to make sure that the soil is prepared well to hold the plastic down.

The higher quality feed can be blended with other forages to improve the overall feeding program for cows.



Newly planted corn in Slate River, ON

Further Research Needed

Much of the research is focused on arid or semi-arid growing conditions and not on cool climates. Higher yields are not seen every year with corn grown under plastic. To ensure consistency with this production method, best management practices need to be created. Further research is needed to determine latest plant date for corn under plastic in comparison to open plantings of corn. Quality of the feed produced due to the plastic mulch could be investigated. There are complex reactions to grain quality due to the use of plastic mulch as the starch content does not increase as the CHU increases. Long term implications of the use of plastic mulch should also be studied to make sure that there are no negative impacts to the soil and the environment.



For More Information

More information on the SAMCO system is found at: www.samco.ie

The Northeastern and Northwestern Soil and Crop Improvement Associations have a report found at:

http://www.ontariosoilcrop.org/wp-content/uploads/2015/07/v11-2014crpadv_cor2_nescianwcia_2014_northern_corn_production_under_biodegradeable_plastic_mulch_with_a_samco_planter.pdf



References

Farrell, A.D. and Gilliland, T.J., 2011. Yield and quality of forage maize grown under marginal climatic conditions in Northern Ireland. *Grass and Forage Science*, 66(2), pp.214-223.

Kwabiah, A.B., 2003. Performance of silage corn (*Zea mays* L.) in a cool climate ecosystem: effects of photodegradable plastic mulch. *Canadian journal of plant science*, 83(2), pp.305-312.

Zhang, S., Li, P., Yang, X., Wang, Z. and Chen, X., 2011. Effects of tillage and plastic mulch on soil water, growth and yield of spring-sown maize. *Soil and Tillage Research*, 112(1), pp.92-97.

