



### Soil Health for Muck Soils in the Holland Marsh and Surrounding Areas

### Project Update JANUARY 2022 | ONTARIO, CANADA

The Project is funded by the Ontario Ministry of Agriculture, Food and Rural Affairs. The information herein reflects the views of the authors and does not necessarily reflect the views of the Government of Ontario.

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### FROM OUR FARMS TO YOUR TABLES

The Holland Marsh Growers' Association helps to promote the Holland Marsh's produce, partners with researchers on projects that impact the growers, help navigate applicable laws and government programs, and work with government and agencies from the municipal to federal levels.



# PROJECT UPDATE

The purpose of this report is to share efforts from members of the Holland Marsh Growers' Association (HMGA) with respect to improving soil health and the sustainability of muck soils. The work pioneered by some growers may motivate and serve as a template to encourage all growers to take up additional sustainable practices. This report also informs the public on sustainable vegetable crop practices.

#### **1. CHALLENGES**

Muck soils are extremely fertile because they are composed of high organic matter. Nevertheless, there are challenges towards maintaining its productivity for the future.

- Weed growth is a major concern. Every time the soil surface is disturbed, more weeds emerge, and some are resistant to treatment.
- Harvest equipment leaves a thick trash layer on the surface that needs to be worked back in the soil.
- Soil salinity continues to increase as vegetable crops require considerable fertilization.
- Muck soil depth varies from several feet of black soil to less than a foot. On the edges of the marshes, the clay subsoil layers can be seen.







#### 2. STRATEGIES

Growers are aware of the above noted challenges and have deployed various strategies to plan field crop rotations and harvest timing. The use of multiple strategies creates best opportunities for sustainable production. Some of these strategies include:

- Tillage and weed treatment (including post-harvest and pre-planting)
- Planting of cover crops
- Field retirement from vegetable production

Each of these strategies are discussed below.

- Introduction of an additional vegetable crop to prolong the rotation
- Use of soil amendments
- Soil testing and nutrient adjustments

#### **Tillage and Weed Control**

Weed control in muck soils is always required. Growers end a crop year by working the residue in the soil and apply a pre-emergence treatment. In the spring, a light till is used to open the surface crust for planting. The spring till also is accompanied by a weed treatment. Post planting, further treatments are used to protect the crop until a full canopy is attained. In mid-season a mechanical till is used to deal with resistant weeds. In mid-August, any persistent weeds are manually removed prior to the weed producing seeds.

#### **Planting Cover Crops**

Fields that are harvested early (September to early October) are tilled to work the residue in the soil and a cover crop is sown either at the time of tillage as a one pass operation or using a seed drill after tillage. The cover crop cover develops a full canopy and suppresses weeds until spring. There are many types of cover crop seeds used depending on the fall timing. Growers prefer a seed type that will not survive winter but will offer a ground cover to protect against wind and water erosion. Seed varieties are also selected to provide beneficial effects for the next crop.



#### **Field Retirement**

In a few instances, fields are systematically retired for a crop year to allow the soil to reset. Each year a field is selected. This strategy requires some management in mid-season to terminate the cover crop and re-plant a second cover crop to offer a full year canopy over the field. A typical cycle includes spring planting a crop like sorghum that produces large quantities of biomass above ground, and an extensive root system. In early August, the crop is mowed and worked into the soil. Once the field is ready for re-planting, a cover crop such as oil seed radish or other cover crop mixes are used. Field retirement is seen as a desired practice to mitigate soil salinity.

#### **Increasing a Crop Rotation**

The Holland Marsh area is renowned for its onion and carrot production. Growers have found markets which enable them to add additional crops in the rotation. These are crops like celery, broccoli, Chinese greens, etc. In some instances, a grain crop such as soybeans is introduced into the rotation. More diverse rotations can have beneficial plant health benefits.

#### Use of a Soil Amendment

Growers are constantly looking to improve their crop yields as an economic goal. While muck soils are very high in organic matter (40 to 70%), with excellent biological activities, growers turn to soil amendments to guard against adverse events that challenge a crop. Soil amendments are federally registered. Their impact on nutrient cycling is difficult to measure, however, anecdotal grower assessment report beneficial effects such as crop maturity evenness and improved product quality.

#### Soil Testing and Nutrient Adjustment

Growers collaborate diligently with their ag retailers who provide fertilizers and scouting services to adjust fertilizer use to crop requirements. Unlike grain or hay crops that might be assessed once in a rotation, fields are sampled annually after harvest and form the basis for recommendations. Each vegetable crop has different nutrient requirements including balancing various micro-nutrients to the NPK levels. Given the late 2021 fertilizer price increases were substantial, growers that have practiced better soil health practices can consider lower fertilization rates as these soils have excellent nutrient cycling through microbial activity and mitigate costs.



#### **3. CONCLUSION**

Adopting several of these strategies on a field-by-field basis requires elaborate planning to achieve benefits over the long term.





#### **KEY CONTACTS FOR THIS PROJECT:**

#### HOLLAND MARSH GROWERS' ASSOCIATION

Jody Mott, Executive Director Email: <u>hmgaexec@gmail.com</u>

#### **CJ AGREN CONSULTING**

Charles Lalonde, Project Manager Email: <u>Charles.lalonde73@gmail.com</u>

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