

## 4Rs Case Study # 2 – Intermediate Practice

**Production:** This farm primarily produces carrots, onions, parsnips, and beets. Approximately one-quarter of the onions are grown from transplants, while the remaining crops are direct seeded. A three-crop rotation is practiced with additional cover crops when seeding can be done before mid-October.

**Challenges:** The farm's fine muck soil is prone to wind and water erosion, leading to nutrient loss. Tillage practices have been adapted to improve soil texture and reduce erosion issues.

**Soil:** The farm features very fine muck soil over a hard clay/silt layer. A portion of the land is cultivated with a spader to mix the clay/silt layer over time, creating a coarser soil texture.

**Infrastructure:** All fields are systematically tiled for drainage, with layouts at 40, 20, and 15 feet to address wet areas. Field-edge ditches have gates to retain tile water and surface runoff for reuse, crucial during the summer's negative water balance. Spring thaw and heavy rain are managed via pumping stations with water exiting the farm property. One area is passively flooded over winter to control wind erosion. Irrigation systems are utilized throughout the farm.

**Production System:** The grower has aggressive yield goals, which are achieved most years. Tillage varies by crop. For carrots, parsnips, and beets the spring seedbed preparation includes one-to-two passes with a deep ripper, followed by discing and cultivating. Residue is worked into the soil post-harvest with one or two passes. For onions, seedbed preparation involves one-to-two disc passes followed by cultivating. Post-harvest, onion tops are worked into the soil, and cover crops are planted. Occasionally, a spader is used to incorporate clay/silt.

Cover crops such as barley or mustard are utilized, with mustard acting as a natural nematode fumigant. During field preparation, care is taken to avoid creating a fine soil surface texture to minimize wind erosion.

The farm uses granular and foliar fertilizers. Foliar applications occur every 10 days for frost-damaged crops, and bio-stimulants enhance crop quality.

Fertilizer records are provided by the ag retailer and can be accessed through the web portal. Other information systems exist (e.g. food safety), however the record systems are not integrated.

**Weed and Pest Management:** Weed control is challenging on muck soil and includes post-harvest, pre-plant, pre-emergent, and post-emergent herbicide applications. Hand weeding occurs throughout the summer targeting herbicide resistant weeds. Additional in-season applications of fungicides and insecticides are used to manage pests and diseases.

## 4R Practices

### Right Source

Fertilizer recommendations are developed by three CCAs, incorporating historical data, fall/spring soil tests, and tissue sampling. Adjustments are made for crop and cultivar differences (e.g., jumbo carrots versus cellos). Soil test phosphorus levels remain in the 90–120 ppm range over an 18-year period.

#### *Products Used:*

Procote encapsulates fertilizer granules with micronutrients, ensuring uniform application.

TerraDrive, a micronutrient fertilizer with plant growth stimulants, is used with starter fertilizers.

Enhanced fertilizers include MAP with zinc and sulfur, ESN (coated ammonium nitrate with a gypsum layer and leaching inhibitor), and Aspire (potash with boron) and additional sulfur.

Penergetic, a biological product, enhances the onion crop uniformity.

### Right Rate

Vegetable crop recommendations are used but adjusted for historical yields and soil test results.

### Right Time

Fertilizers are applied in the spring and top dressed during the season. Liquid foliar is used early in the season on the transplanted onions and as a top dress in mid-season.

### Right Place

Granular fertilizers are broadcast with an airflow spreader while foliar fertilizers are top dressed in season.

## Regenerative Practices

- Extensive use of cover crops using either mustard or barley.

- Uses barley as a nurse crop to prevent early season wind erosion.
- Runoff water is reused for irrigation.

## Conclusion

The grower is achieving superior yields by using enhanced fertilizers coupled with coated nutrients. Both soil and tissue testing are used to plan recommendations and adjust plant needs in season. Environmental challenges are being addressed that will impact soil loss. The grower relies on the ag retailer data management system which has access to a web portal to access records.

## Gaps and Opportunities

- Clearly stated goals are not available and therefore measuring improvements over time is difficult.
- The farm is currently testing two types of buffer strips to determine how to proceed with buffer use along waterways. Where fields are protected with berms, strips are not required.
- The farm can use 4R program certification in their marketing plan to promote their sustainability efforts.

## 4R Rating

This grower is rated intermediate as several in-field and edge-of-field practices are being used in combination with the 4R program.