Increased incidence and severity of root diseases caused by soilborne pathogens have contributed to poor soil quality and health, reduced yield, and lower profitability of vegetable production in New York. Plant roots are the ultimate integrators of their surroundings, thus they are good indicators of soil health. In general, we have been using soil bioassays with bean to visually assess the soil suppressive capacity of target fields and implemented sustainable soil management practices against soilborne root pathogens. A minimum of 4 soil samples are collected per field or management practice, planted to bean, and root health (root rot severity) is rated after 4–6 weeks on a scale of 1 to 9 (>80% root affected and at various stages of decay). Similarly, on-farm visual soil bioassays with lettuce and cowpea were developed for assessing soil infestation levels of the root-knot (Meloidogyne hapla) and lesion (principally, Pseudomonas syringae) nematodes. The severity of mass root-knot galls and lesions caused by M. hapla and P. syringae, respectively, on beans in a measure of the level of soil infestation, which is also rated on a scale of 1 to 9. Thresholds have been developed for several crops (onions, carrots, lettuce) for guiding management decisions. These soil bioassays provide cost-effective tools that can be readily integrated into IPM programs for various crops for managing soilborne pathogens on a needed basis and for assessing the general soil suppressive capacity. The participatory training of interested growers and other personnel is currently on-going.

### Soil Sampling and Assay Protocols

Since the distribution of soilborne fungal and nematode pathogens within a field is patchy and uneven, adequate sampling is critical to accurately assess soil suppressive capacity and nematode infestation levels. The visually or chemically identified field of a portion of a field. A composite sample of each 4 samples should be collected from 15 to 20 subsamples is recommended. Although increasing the number of samples will increase the accuracy, the number of samples should be limited to keep within the configuration of the field, size of the sprayer, etc. After the soil has been thoroughly mixed, a representative container with stoppers is filled and plowed to either 0–3 cm. The root health bioassay is used for evaluating the soil bioassay for root-knot and lesion nematodes, respectively. After 4–6 weeks, the roots are carefully removed and washed free of soil until running tap water. For the root health bioassay, the plants are scored for root rot severity on a scale of 1 to 9 (0–80% root affected and at various stages of decay). The severity of the root-galling on the lettuce roots is a reflection of the M. hapla infestation level in the soil and is therefore rated on a scale of 1 (healthy) to 9 (>80% roots galled) based on the percentage of galls root. The rating scale for assessing the severity of lesions on cowpea as a result of lesion infection in currently ongoing and will be based on the number of lesions on the main taproot.

### Soil bioassays to determine soil suppressive capacity and nematode infestation levels

For the root health bioassay using bean, roots with ratings from 1 to 3 are considered highly functional (healthy), 4 to 6 are moderately healthy, and 7 to 9 are severely diseased (unhealthy). For M. hapla, the observed root-galling severity (RGS) has been closely correlated with soil nematode counts made by direct extraction and identification of the nematodes from the soil. This has made it possible to establish threshold severity ratings that can be used as benchmarks to decide on the need for nematode management. If planting in average, an average RGS ≥3 indicates that the sample area will need to be treated with a chemical nematode or rotated to a non-host crop. However, for a more sensitive crop like lettuce, a sampling area with an average rating of ≥2 should be managed before being planted to carrot.