

By Robert G. Wilson

A sound crop rotation is a key component of effective pest management and stabilization of sugarbeet root yields. Sugarbeet hasn't always been grown in rotation with other crops. When sugarbeet production was initiated in Europe, some promoters of the crop felt sugarbeet could be planted in the same field year after year. This worked for several years until populations of beet cyst nematode increased and root yields began a rapid decline. It then became apparent that sugarbeet production could be stabilized if sugarbeet was grown in rotation with other crops.

Several long-term rotation studies were conducted in Nebraska, Montana, and South Dakota beginning in the early 1900s and continuing at some locations for 29 years. The results of these studies were similar: sugarbeet production improved:

- 1) when the crop was grown in rotation,
- 2) when the rotation included alfalfa; and
- 3) when crop rotation increased from a three-year to six-year rotation.

At the Nebraska location it became apparent that root-knot nematodes were affecting sugarbeet yields. The density of root-knot nematodes increased rapidly in two-year rotations, declined somewhat in a three-year rotation, but declined markedly in a rotation that included sugarbeet once every four to six years.

Crop rotation can be very effective in suppressing certain diseases and weeds. Generally crop rotation isn't effective against highly mobile pests such as aphids or diseases that are spread by wind. As a general rule the more frequently sugarbeet are grown, the more rapidly disease organisms or nematodes build up to damaging levels. Breaking this cycle by planting a crop the pest can't affect causes the number of disease organisms in the soil to decline.

A good example of this phenomena can be demonstrated with beet cyst nematode. Each year about 50 percent of the nematode cysts hatch and try to infect sugarbeet or weed hosts. If a host plant cannot be found, the nematode dies. If following sugarbeet, the nematode population was 50 cysts per gram of soil, one year later without a susceptible host the population would decrease to 25 cysts, after two years 12.5 cysts, three years 6.25 cysts, and four years 3.1 cysts. When the nematode population declines below the threshold level (the level of nematode which will not cause an economic yield loss), it would be economically feasible to again grow sugarbeet.

The type of crops grown in rotation and the position of sugarbeet in the rotation are very important factors to consider. *Rhizoctonia* root rot can affect sugarbeet, dry bean, potato, and alfalfa but does not affect corn or small grains. The effect of this disease can be reduced in a three- to five-year rotation by planting small grains before sugarbeet.

Crop rotation can help break the destructive cycle of sugarbeet disease organisms building to damaging levels in the soil.

In a similar manner the disease aphanomyces root rot can be reduced by crop rotation with nonsusceptible crops such as corn, soybean, potatoes and small grains. If sugarbeet follows susceptible crops like alfalfa, dry bean, sweet clover and clover, the disease incidence will increase. Cercospora leaf spot incidence will decline if sugarbeet are rotated with non-host crops and infected sugarbeet tops are plowed under. The disease rhizomania is an exception and is not reduced by crop rotation once disease symptoms have been observed on sugarbeet. Infected fields can be cropped to other non-host crops for up to 15 years and the disease will still be present in the field to infect sugarbeet.

Rotation also can improve weed control. Corn and small grains are usually more competitive with weeds than other crops. Both crops shade the soil rapidly and have many herbicides available to suppress weeds. Corn and small grains can be positioned as crops to reduce annual and perennial weed populations. Some effective crop rotations (see *Table 4.1*) for weed, disease, and nematode control would be: dry bean/corn/sugarbeet/corn where corn could be replaced with small grain and alfalfa for three years/corn or small grains/sugarbeet/dry bean. With all crop rotations make sure the herbicides used in the previous crop do not pose a carryover threat to the following sugarbeet crop.

Table 4.1

Example of effective crop rotations for sugarbeet.

Rotation No. 1	Year
Dry bean	1
Corn or small grain	2
Sugarbeet	3
Corn or small grain	4
Rotation No. 2	Year
Alfalfa	1
Alfalfa	2
Alfalfa	3
Corn or small grain	4
Sugarbeet	5
Dry bean	6