

Legumes in the Northeast

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Because the Northeast USA contains several major human population centers, dairy farming is the number 1 agricultural enterprise in NY State as well as the Northeast USA. Therefore, forages are very important to support dairy operations. Almost 2 million acres of forages were in production in NY State in 2010. Perennial legumes such as alfalfa, red clover, and birdsfoot trefoil provide livestock with protein and other essential nutrients. Most of the acreage of these forages are in plant species mixtures, especially with grasses such as timothy, smooth brome grass, orchardgrass, etc.

Several challenges to improving the productivity and quality of these forages are being addressed by the Cornell Forage Breeding Project. Some of our research activities are in cooperation with the NE1010 Multistate Cooperative Research Project. For example, we have been comparing various breeding methods for improving alfalfa forage yield. Our current method being studied is replicated clonal evaluation at multiple locations in the USA and Canada. For a few decades we have been engaged in improving forage quality by selecting for various quality components. We were not very successful in altering ratios of fiber components, but we have been successful in improving neutral detergent soluble fiber (mostly pectin), resulting in the alfalfa cultivar N-R-Gee.

As everywhere else, several diseases and insects cause problems in alfalfa. Resistance to at least five major diseases (bacterial wilt, Verticillium wilt, Fusarium wilt [south of NY], Phytophthora root rot, and anthracnose race 1) are essential in alfalfa cultivars in the Northeast. We also have made some progress in breeding for resistance to crown rot in alfalfa. At Cornell, we have made significant progress in breeding for resistance to potato leafhopper, alfalfa snout beetle, and clover root curculio. As a general mechanism against biotic and abiotic causes of taproot breakage, we have released some cultivars with higher potential for root regeneration after taproot severing. As part of the NE1010 project, we are participating in breeding for alfalfa tolerance to acid soil.

In NY, red clover persists for a maximum of 3 production years, with the third year yield significantly lower than in the first two. The extent of Cornell's breeding effort is to participate in a NE1010 project to breed for wider adaptation.

One of the primary limitations in use of birdsfoot trefoil since the 1970s has been Fusarium wilt. A few years ago, Cornell released the first cultivar with resistance. 'Pardee' has about 50% resistance and also has higher forage yield than most cultivars in the absence of the disease, and has the highest yield and longevity where the disease is a problem. Now we are combining this resistance and high yield with the rhizomatous trait.