HOW FAST DO CRANBERRY VINES TAKE UP NITROGEN?

Nitrogen (N) is the most common fertilizer element applied to cranberry beds. We know that cranberry preferentially utilizes N in the ammonium form. Although research has shown that cranberry can take up nitrate nitrogen as long as there is concurrent uptake of ammonium nitrogen, research has also shown that there is little to no activity of nitrate reductase (an enzyme that changes nitrate to ammonium that can be used by plants) indicating that only ammonium nitrogen contributes to cranberry growth and development.

Research by Hart et al. (1994) has shown that nitrogen applied in the current year has no effect on fruit set or yield during that same year. In this research we ask the question "how long does it take applied fertilizer to be absorbed and moved into the leaves?"

Methods:

Plots (2 x 2 m) were established in a commercial bed of 'Stevens' cranberries. Three treatments were imposed. 1) Control (no N applied); 2) N applied; and 3) labeled N applied (ammonium sulfate enriched to 1% with ^{15}N per plot). The N rate for treatments 2 and 3 were equivalent to 5 lbs N/a, about one quarter of a typical annual application to bearing beds. Fertilizer was dissolved in water and spread evenly across each plot to wash any residual fertilizer off the foliage and into the soil. Treatments were made when uprights showed 1.5 cm of new growth (roughneck to hook stage), a time of maximum N demand in cranberry. Plant tissue samples were collected from each plot prior to fertilizer application and then daily for 7 days after fertilizer application. Plant tissue samples were also collected 14, 21 and about 60 days after N application.

Samples were oven dried and then ground to a powder. Samples were analyzed for percent nitrogen and the concentration of ^{15}N (fertilizer).

Results and Discussion:

The baseline tissue ^{15}N concentration prior to fertilizer application was equal to natural abundance (0.366% ^{15}N). ^{15}N concentration in tissue from untreated plots and those treated with unlabeled fertilizer did not vary from natural abundance throughout the experimental period (Fig. 1).

In plots treated with ^{15}N labeled fertilizer, tissue ^{15}N concentration was above natural abundance within one day of fertilizer application (Fig. 1). In WI the abundance of ^{15}N plateaued from day 2 through day 14. This suggests that most of the fertilizer that will be taken up is absorbed by the roots within a few days following application. The decrease after day 5 is from dilution.

This research was also conducted in MA, NJ, and OR. Uptake of N was slower in MA and OR. Weather data from MA and OR show it was cooler at the time of application and for the next few days after application, suggesting that temperature (air or soil) influences the rate of uptake. If the weather turns cold after applying N uptake will take longer than if the weather is warm.

It is clear from these data that N fertilizer becomes plant available in the root zone rapidly after application. There is little "lag time" between application and uptake. It is important to remember that detected ^{15}N strictly indicates presence and does not indicate if the detected N is in a soluble form or has been metabolically incorporated into amino acids, proteins and other compounds found in cells.

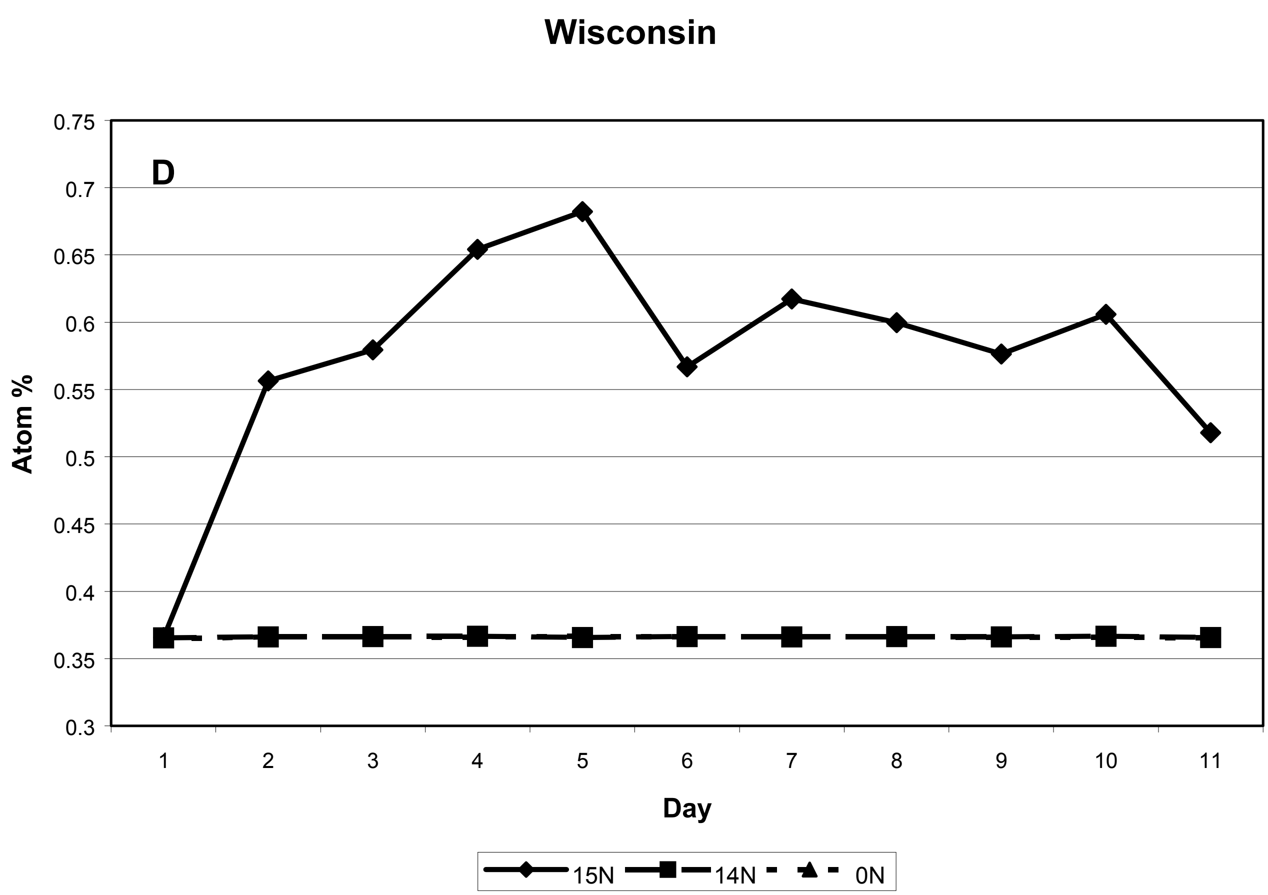
This research supports split applications of N to cranberry beds. Once the fertilizer is applied it is quickly taken up.

Literature Cited

Hart, J., A.P. Poole, B.C. Strik, and N.W. Christensen. 1994. Nitrogen fertilizer rate and timing trials in Oregon. Proc. Wisconsin Cranberry School 5:18-22.

Hart, J., J. Davenport, C. DeMoranville, and T. Roper. 2000. Nitrogen for bearing cranberries in North America. Oregon State University, Corvallis, OR. Extension Bulletin EM 8741.

We thank Ocean Spray Cranberries for supporting this research.



OPTIMAL VINE DENSITY

Yield of cranberry vines is related to the number of uprights per unit area. Areas of beds with low upright populations also produce few fruit. Areas of beds with higher upright populations produce more fruit—to a point. Once upright density is too high crowding and competition result and yields are reduced.

What is the optimal upright density for maximum yields? Some old work (1940's) in Wisconsin suggest the optimal upright density is between 200 and 300 uprights per square foot. It is not clear what cultivar was used. I know of no subsequent work to refine this estimate.

Why do yields decrease with increasing upright density? When too many uprights grow in a given space they compete for water, nutrients, and perhaps most importantly, light. When uprights are crowded they elongate seeking light. Putting shade cloth over a section of vines can produce this same phenomenon. The uprights become weak and spindly as they grow longer. As the vegetative growth increases resources are shifted from fruit growth.

Another factor is insect access to the flowers. If the flowers are hidden in a dense canopy insects have trouble getting to them. They may also have trouble jarring the flowers sufficiently to shed pollen from the anthers. Further, pollen does not shed readily in a damp environment.

What can you do to manage upright density? Many of the practices you already use manage upright density. For example, carefully managing nitrogen fertility prevents too much vegetative vigor. Sanding can reduce upright density. Pruning certainly reduces upright density.

The difficulty, in my view, is to maintain relatively uniform upright density across a bed. My experience is that beds are non-uniform with regards to upright density and yield. One of the difficulties of field research is to estimate yields based on small samples taken from a bed. Taking care to spread fertilizer uniformly can help. Providing good drainage and even irrigation promotes uniformity across a bed.

In the case of cranberries we want optimum upright density, not maximum upright density.

Teryl R. Roper, UW-Madison Extension Horticulturist

The pure, the bright, the beautiful
That stirred our hearts in youth
The impulses to wordless prayer,
The streams of love and truth,
The longing after something lost,
The Spirit's yearning cry,
The striving after better hopes—
These things can never die.

The timid hand stretched forth to aid
A brother in his need;
A kindly word in grief's dark hour
That proves a friend indeed;
The plea for mercy softly breathed,
When justice threatens high,
The sorrow of a contrite heart—
These things shall never die.

Let nothing pass, for every hand
Must find some work to do,
Lose not a chance to waken love—
Be firm and just and true.
So shall a light that cannot fade
Beam on thee from on high,
And angel voices say to thee—
"These things shall never die."

Charles Dickens

ALIETTE FUNGICIDE REGISTERED ON CRANBERRY

Aliette WDG fungicide (active ingredient fosetyl aluminum) has been approved for use on cranberry to control Phytophthora root and runner rot. This is a supplemental label, meaning if you plan to use the product you need to get a special label from the dealer—cranberry is not on the regular label. Aliette should not be mixed with copper fungicides, and if used either before or after copper fungicides, the pH of Aliette should be raised to 6.0 or higher. Aliette should not be used with uptake adjuvants, surfactants, or foliar fertilizers as this could lead to phytotoxicity.

The research on Aliette and Phytophthora root and runner rot was conducted in Massachusetts where the nastiest pathogen, *P. cinnamomi*, is present. *P. cinnamomi* has not been found in Wisconsin. *Phytophthora* species in Wisconsin are apparently less aggressive, but can do damage in poorly drained areas. Before you seriously consider whether to use Aliette or Ridomil (the other fungicide for Phytophthora) you should have samples tested at the disease clinic in Madison (send to: Disease Clinic, Dept. Plant Pathology, 1630 Linden Dr., Madison, WI 53706).

Patty McManus, UW Dept. Plant Pathology

Wisconsin Cranberry Crop Management Newsletter
Dept. of Horticulture
1575 Linden Drive
Madison, WI 53706-1590

UW Extension

Nonprofit Org.
U.S. Postage
PAID
Madison, WI
Permit No. 658