Cooperative Extension
Coastal Washington Research & Extension Unit
Long Beach, WA 98631

CRANBERRY VINE

September 1995

THE STATION/PCCRF

Great progress is being made towards becoming self-supporting. The 1994 and new 1995 plantings are all growing well and new ground is being prepared for additional plantings next year. The new pumphouse, pump, electric hook-up, and intake are almost ready for use. With money from The Cheney Foundation, we have added new signs for on-farm tours and are getting ready for new exhibits in the Museum. Additional land has been purchased (land locked within the existing property). We are setting new records for numbers of Museum visitors. I thank everyone and continue to encourage membership in the PCCRF.

WEATHER

A warmer than average July helped to set a better crop than many growers expected, but a cooler than average August isn't helping fruit size.

	Rainfall (Inches)					Growing Degree Days				
Month	1995	1994	1993	1992	20 yr av.	1995	1994	1993	1992	10 yr av.
January	14.9	8.1	8.7	14.4	10.8	108	76	22	69	40
February	7.4	12.1	1.4	6.0	9.3	84	26	63	118	55
March	8.3	6.4	8.1	1.7	9.5	90	137	94	145	72
April	7.4	5.6	10.3	9.9	5.6	133	164	147	189	116
May	2.8	3.4	5.9	0.9	3.8	280	276	360	296	216
June	3.0	2.9	3.3	1.4	2.8	362	340	386	388	323
July	0.9	0.7	1.8	0.4	1.9	516	440	458	486	421
August	1.6	1.4	0.7	1.3	1.7	415	503	478	477	440
September		1.8	0.3	2.6	4.1		439	359	314	363
October		8.5	2.9	5.2	6.5		171	249	194	217
November		17.0	5.0	11.0	11.4		25	23	69	99
December		17.6	14.0	8.3	12.6		15	35	4	41
TOTAL		85.5	62.5	63.1	80.5		2612	2674	2749	2402

BOG MANAGEMENT

New Plantings. If you are buying vines for a new planting, now is a good time to make observations on possible sources. I have been impressed by two factors in vine selection. 1) Stevens vines are not necessarily Stevens vines. Recent DNA finger-printing by Dr. Nick Vorsa at Rutgers University of Stevens in Washington and other states indicated wide variability between and within bogs. The important point is to assure the vines have a good yield record. Don't assume that, just because they are Stevens, you will be guaranteed good yields. 2) The PCCRF has planted all sorts of graciously donated Stevens vines. What is most interesting is to see the differences in amount of weed seeds and

species of weeds that come with the different vines. It really makes a difference in weed control if you get clean vines and now is the time to check.

Weed Mapping. As I have stated in the past, a good mapping system for a cranberry bog is key to understanding what is happening in your bog, as well as how to manage it in the winter when everything looks very similar. In addition to maps of weeds, weak areas and overgrowth areas should be considered. This will help guide herbicide use more precisely in some of these spots. Vines that are showing off-color this time of year might indicate some type of stress such as weevil, girdler, underwatering, or underfertilizing that would be critical to look at in detail at a later date. Other mapping ideas could include fertilizing patterns and sprinkling patterns that easily can show up now due to the slight differences in color of the vines. When the vines go dormant it is almost impossible to tell what happened where.

Weevil Control. It is important that growers not become lax about weevils just because they put out Cryolite bait. Control of this insect is complicated and involves multi-year treatment. It is not likely to go away for a long time. New research out of Belgium (Castells, et al. 1994. Med. Fac. Landbouww. Univ. Gent. 59/2a) indicated that the maximum lifetime of weevils is 576 days, averaging 404 days, with up to 200 of those days being productive for egg laying. They reported that the average number of eggs laid by an individual during its life is 1600. Sixty-five percent of the weevils lay 3-5 eggs a day. Growers who have the ability to flood this fall after harvest by all means should still do so. Growers who can't flood should plan to use Cryolite again. Nematodes applied in September remain an important alternative control method for weevils.

Vole Management. Voles can be difficult to manage since use of chemicals is not allowed on the bogs. The key to identifying voles is finding a curving line of dead uprights in a pattern in the bog and being able to pull up an individual upright to see if it has a nice clean bite mark through it. We have recently had some reasonable success using raptor perches around the dikes to control voles. Although it is difficult to prove cost effectiveness and efficacy, these certainly can be used to improve wildlife habitat. Perches (alder poles 15-20 ft. tall with a cross on top) around problem areas allow some of the roosting raptors, such as red-tailed hawks and night owls, to provide easy spotting of voles. We have seen them successfully used several times just after putting them up in some areas.

Poast - mortem. Poast is the best thing to happen to growers in a long time. Most growers report great success controlling grass with Poast with no phytotoxicity problem. If you did not use it this year, do consider it for next year. There should be no excuse for having grass as a weed anymore.

Bog Nutrition. Flower bud set for next year is dependent on adequate bog nutrition. In areas of heavy crop load and pale leaf color, consider an additional nitrogen application as a means to improve next year's crop and this year's fruit size.

It is a common practice to put out high doses of potassium in the fall for winter hardiness. Our results to date have not confirmed that potassium itself will induce hardiness. However, we have noticed that the most hardy buds on Stevens came from bogs that had the highest overall nutrition, including potassium, nitrogen, phosphorus, etc. Vines that I thought were almost over-luxuriant in nutrition and last to change color in the fall were some of the hardiest bogs we tested. We should have more data at the end of next year to really give us a good feeling for the role of nutrition in hardiness of cranberry vines. To date, the only really non-tentative conclusion I can make is that vines which were weak, crunchy, and on sandy bogs, were 3-4° F less hardy during the dormant season than those which had good healthy uprights on peat.

PUBLICATIONS

Four new bulletins are available that are relevant to cranberry growing. The first is **Cranberry Tissue Testing** for nutrients. It deals with the way to take a sample and what the results mean. This was put together by the Cranberry Nutrition Working Group and is, or will be, available from Extension offices in all cranberry growing states. Because of its timeliness (now is the time to leaf sample), I have enclosed the bulletin with this Cranberry Vine issue. A special thanks to Dr. John Hart at Oregon State University for doing a lot of the work in getting this to press.

The second bulletin is the **Estate Planning Basics for Washington Farm and Ranch Families, EB1231.** Passing the farm to the family can be a very difficult scenario after the fact. Good estate planning is critical for all growers who have accumulated years of hard work and management on the property and don't want to see it sold off. It is a very broad and complex subject and needs a lot of thought. This publication goes into great detail about various aspects of that. It is available at Extension offices.

Lastly are **The 1995 Establishment and Production Costs and Returns for Southwest Washington Wet** and **Dry Harvest** bogs. These have just been completed. **EB1805** is for dry harvest and **EB1806** for wet harvest. The data provided in these were compiled by a group of farmers and are quite realistic. It is very surprising to see how much it really costs to farm. For example, it costs $40,000 per acre to bring a wet harvest bog into the fourth year on a per acre basis. These budgets are quite complicated and beyond the grasp of a simple summary. These publications are critical for farmers needing a financial plan or considering putting in a cranberry bog. They will certainly discourage a lot of "cranberry wannabees" from going into the business.

MISCELLANEOUS

Best Management Practices. The BMP's produced by the farmers have been compiled and presented to the State Conservation District. These now need to go out for review to various approving agencies such as the Department of Ecology. So far the process is proceeding smoothly, as we had hoped. We are also getting some interesting results on some of the BMP research which I will report later.

Pond Water Quality. Farm ponds in areas rich in iron and organic matter tend to turn very dark and have extremely high turbidity (poor clarity) this time of year. There is nothing inherently wrong with this except for the coating of iron sediment it leaves on the fruit and the plant. We suspect that this coating also reduces leaf photosynthesis. I suspect, therefore, we could find a good link between irrigation water quality (clarity) and overall bog productivity. I have seen very few high producing bogs with poor water quality. After fiddling with this problem for a few years, we have been able to take water with a visibility of only 3 inches and increase it to 3 feet. So far, a single treatment appears to be holding water quality for over a month. The process is somewhat tricky, involving aeration and addition of a flocculation and coagulation compounds. Because of widely fluctuating water chemistry among ponds, each pond would require slightly different treatments. Cost effectiveness is difficult to assess. It cost us about $200 to treat a 220,000 gallon pond. Aeration by itself, although helpful, was not sufficient to markedly improve pond water quality.

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Cranberry Tissue Testing

for producing beds in North America

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Why use tissue testing?

Cranberry plants require proper amounts of certain chemical elements from air, water, and soil to ensure adequate vegetative growth and fruit production. When levels of these nutrients in the plant are low, growth and yield may be affected.

Severely reduced nutrient supply can lead to visible nutrient deficiency symptoms. Routine collection and analysis of tissue samples can detect low nutrient concentration *before* visible symptoms or yield reduction occurs.

Mineral nutrients such as nitrogen (N), phosphorus (P), and potassium (K) are added through fertilizers to supplement the supply from the soil. By analyzing dried plant tissues for their nutrient content (tissue testing), you can evaluate the adequacy of mineral nutrients. This information will help you decide if fertilizer is needed, and if so, how much and what kind to use.

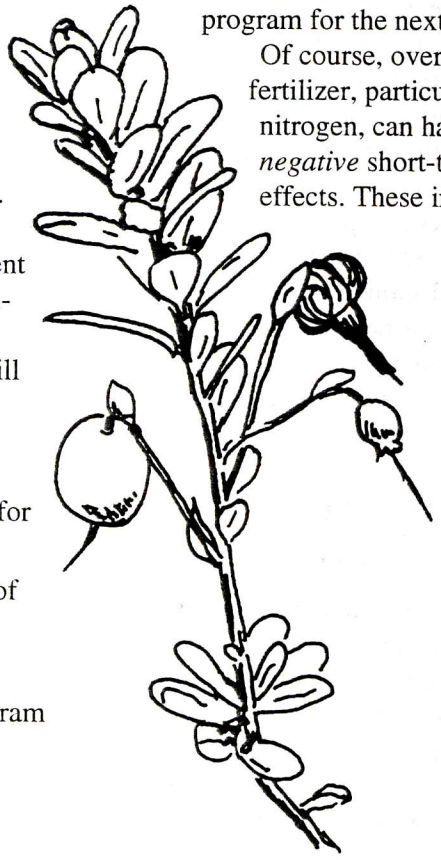
Tissue testing can be used for any of the following:

- Predicting fertilizer needs of annual crops
- Diagnosing problems
- Evaluating a fertilizer program for perennial crops

Tissue testing can be used to monitor and adjust fertilizer use during early growth stages of annual crops such as potatoes, sugar beets, or lettuce. By using a tissue test, growers can anticipate fertilizer needs for these annual crops.

In contrast, using tissue test results to anticipate *current* season fertilizer needs does not work well for perennial crops like cranberries. In part, this is due to the minimal short-term effect of fertilizer on yield in perennial crops. Therefore, tissue testing in producing cranberries is best used for end-of-season evaluation of a fertilizer program for the next year.

Of course, over-use of fertilizer, particularly of nitrogen, can have *negative* short-term effects. These include stimulation of excessive vine growth and fruit rot.



If problems such as poor growth or discoloration of vines appear during the growing season, you can use a comparative tissue test to check for possible nutrient deficiencies. You can collect samples to diagnose deficiencies at any time during the season. However, when outside the August–September time period (see "When to sample" on page 2), you also must collect a companion sample from an unaffected area for comparison.

Before using tissue testing to predict or evaluate fertilizer needs, you need the following information, which is provided in this publication:

- Sampling time (stage of development)
- Plant part to sample
- Normal or sufficient concentration range for each nutrient so you can interpret results

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When to sample

Tissue samples should be collected when nutrient concentration is stable. Samples collected just a few days apart during periods of rapid change in nutrient concentration can give quite different results.

The change in nitrogen (N) and potassium (K) concentration in new shoots of Massachusetts "Early Black" cranberries during the 1988 growing season is illustrated in Figure 1. Tissue concentration changes rapidly early in the growing season. Compare the late August–early September sample results to samples collected between May 25 and June 24.

Tissue levels of both elements changed during the season but reached a constant level between August 23 and September 17. Samples collected between those dates should produce consistent analytical results.

Cranberry tissue research in Oregon produced similar results (Chaplin and Martin, 1979). See "For more information" on page 3.

Figure 1 also illustrates the danger in collecting late September samples. Nitrogen concentrations decrease as plants enter dormancy, so these samples may not give an accurate picture of the situation in a bed.

Collect cranberry tissue test samples during the stable period—late August to early September. Sampling cranberry tissue at any other time is not recommended except for samples collected for comparative tissue testing.

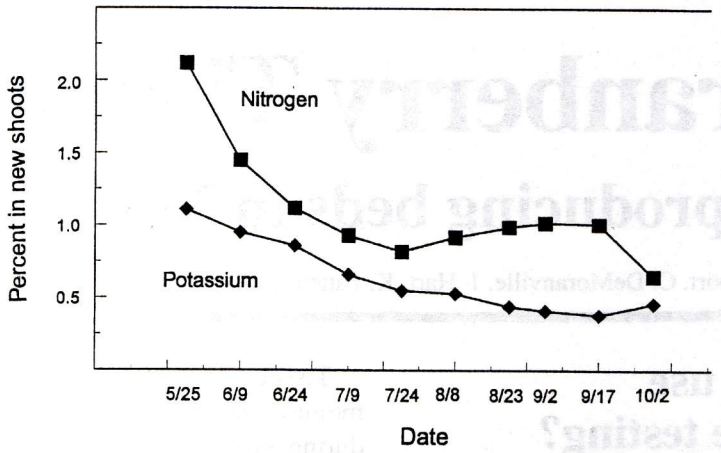

Figure 1.—Nitrogen and potassium percent in new shoot tips of "Early Black" cranberries in Massachusetts, 1988 (DeMoranville, 1992).

Part of cranberry to sample

A cranberry tissue sample should include current season growth from both fruit-bearing and non-fruiting uprights. To sustain uniform yields from year-to-year, fields should have a mixture of both types of uprights.

Figure 2 illustrates the tissue to collect. Clip just above the berries on fruit-bearing uprights. Clip above the bud break location on non-fruiting uprights to collect only current season tissue.

Collect 20 tips each from 10 locations representative of the bed. The total sample will consist of 200 upright tips per bed or 1 to 1½ cups of plant material.

Do not wash the sample or separate the leaves and stems.

Frequency of sampling

Sampling cranberry tissue from all fields annually is ideal for gathering nutrient status information. However, you may feel annual sampling is not necessary or financially feasible. Regardless of whether or not you sample every year, develop a plan for regular sampling.

Begin with fields that are not growing or yielding as desired. Annual sampling from these fields will be necessary until the problem is determined or corrected.

Divide the remainder of your acreage into two or three groups. Sample from a group of fields each year. In this way, you will sample one-half or one-third of the acreage each year.

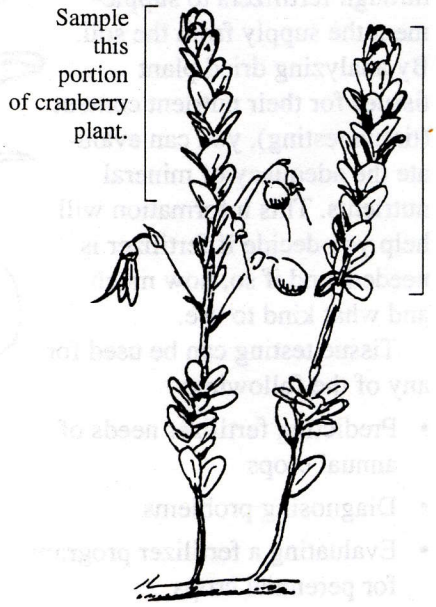

Figure 2.—Obtain tissue sample from area shown.

Interpreting laboratory results

Compare the results from a laboratory analysis to the values in Table 1 on page 4 to determine if sufficient nutrients were supplied by the soil and your fertilizer program.

Lower than normal tissue nutrient concentrations are common with vine overgrowth. In this case, low tissue nutrient concentration is caused by the nutrient content of the tissue being diluted by the intensive growth.

This situation should correct itself when growth returns to normal. Therefore, do not apply extra fertilizer to correct low tissue concentrations in a situation of vine overgrowth.

Review the vine growth and crop load from current and last season. Choose the combination of tissue analyses and crop growth listed below that corresponds to your situation. Follow the instructions given for the appropriate category.

- **Low tissue analyses and abundant vine growth**. If vine growth is luxurious, don't apply additional fertilizer.
- **Low tissue analyses and weak vine growth**. If vines are weak, discolored, or stunted, apply fertilizer at rates recommended by your local Extension Service.
- **Normal tissue analyses and vine growth**. If your tissue analyses are within the normal range, continue with your current fertilizer program.
- **Above normal tissue analyses and weak vine growth**. If the vines are weak, discolored, or stunted, and the tissue analyses are above normal, look for stress from pests, drainage, drought, frost, or other factors limiting growth.
- **Above normal tissue analyses and vine growth**. If your tissue analyses are above normal and vine growth is adequate or above normal, reduce the amount of fertilizer you have been applying.

Other considerations

Tissue analysis results outside the normal range cannot always be attributed to your fertilizer program. Insufficient mineral nutrient concentration can be caused by saturated or dry soils; high temperatures; frost; shade; weed, insect, or disease pressure; or herbicide injury.

Several fungicides contain plant nutrients. Because tissue samples are not washed before analysis, high copper (Cu), manganese (Mn), or zinc (Zn) may be the result of fungicide residue. High boron (B) and Zn also may occur if liquid fertilizer was used.

High levels of manganese are common in cranberry tissue. If Mn-containing fungicides have not been used and the tissue concentration of Mn exceeds 300 ppm, soil drainage may be inadequate.

In this case, check the drainage conditions of your bed. If the soil is poorly drained during the growing season or if there are numerous wet spots or poorly drained areas, consider improving the soil drainage with ditching and perforated flexible drain pipe (or lines).

For more information

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How to collect cranberry tissue samples

Sample collection

- Collect tissue samples between August 15 and September 15.
- Do not collect samples from weak, weedy, or diseased areas unless the entire bed has a problem.
- Do not mix varieties in a sample.
- Collect tissue randomly across the bed.
- Clip current season growth from above the berries on fruit-bearing uprights or from approximately the upper 2 inches of growth on non-fruitful uprights.
- Do not collect berries, growth below berries, or growth below the point of bud break.
- Collect 20 upright pieces each from 10 locations representative of the bed.
- The total sample will consist of 200 upright pieces per bed or 1 to 1½ cups of plant material.
- One composite sample per bed is adequate if field condition and yield are uniform.
- Multiple samples may be needed if field size is more than 10 acres.

Sample handling

- Do not wash or rinse the sample.
- Allow the sample to air dry at room temperature before mailing to the laboratory. This should take a few days, depending on temperature and humidity.
- Put samples in paper bags or paper envelopes for mailing. Vented plastic bags such as Ziploc™ brand vegetable bags also may be used.
- Label each bag with the bed number or another identification code.
- Do not put samples in unvented plastic bags as the samples may mold in transit.
- Avoid mailing after midweek as the samples may sit in the post office or laboratory over the weekend.

Laboratory analyses

Request determination of: (N) nitrogen (B) boron (S) sulfur (if available at no additional cost) (Ca) calcium (Mn) manganese (K) potassium (Cu) copper (Mg) magnesium (P) phosphorus (Zn) zinc

Table 1.—Cranberry tissue nutrient content guidelines for producing beds.

Nutrient	Normal concentration[1]
	Percent
Nitrogen (N)	0.90–1.10
Phosphorus (P)	0.10–0.20
Potassium (K)	0.40–0.75
Calcium (Ca)	0.30–0.80
Magnesium (Mg)	0.15–0.25
Sulfur (S)	0.08–0.25
	ppm
Boron (B)	15–60
Iron (Fe)[2]	> 20
Manganese (Mn)[2]	> 10
Zinc (Zn)	15–30
Copper (Cu)	4–10

[1]Normal levels are based on samples taken between August 15 and September 15.

[2]Cranberry researchers have not found a normal range for Fe and Mn.

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Illustrations by Meredith Albright, freelance scientific illustrator, Bellingham, MA.