Integrated
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Management
for Wisconsin

Cranberry

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POTASSIUM IN SOIL

The source for plant nutrients is the soil. In order to understand the reactions of potassium in soil, it is necessary to understand a few basics about soils. A fertile soil is one that can retain and release nutrients for plant use. The ability of soils to hold and release nutrients varies according to its makeup (Sand, silt, clay, organic matter). Soils are composed of four parts: 1) a mineral fraction, 2) an organic fraction, 3) a liquid fraction (water and what is dissolved in that water), and 4) a gaseous fraction (air in soil).

Soil potassium can be divided into three fractions: 1) potassium that is part of the structure of soil minerals, 2) potassium adsorbed onto soil particles and colloids, and 3) potassium in the soil solution (liquid fraction of soil). Potassium from each pool varies in its availability for plant growth.

Potassium held in the mineral fraction of soil is not readily available. It becomes available as the minerals weather, but the rate of release is too slow to meet crop needs. Further, most of the mineral fraction potassium is held in layers in clay particles and cranberry soils usually have a very small clay component.

Potassium ions can be held on the exterior of soil particles and colloids. This potassium is not held tightly within the mineral structure, but is held loosely on the outside. These soil particles have a net negative charge while potassium has a net positive charge (K^+). This is similar to sticking a magnet to your refrigerator. The magnet stays in place, but it is easily taken from the refrigerator and attached to the stove or some other metal object. Adsorbed potassium can move in and out of the soil solution in response to the concentration of potassium in the liquid fraction. Thus, an equilibrium exists between potassium adsorbed to soil particles and potassium in the soil solution.

Adsorbed K

Dissolved K

Potassium that is held in the soil solution is readily available

for plant growth. Potassium that is taken up by plant roots comes only from the soil solution. Plant roots cannot take up potassium directly from soil minerals or from adsorption sites. As potassium is actively taken up by roots the concentration in the soil solution immediately surrounding the root declines. In order to maintain an equilibrium adsorbed potassium is released into the soil solution.

The size of each potassium fraction depends on the composition of the soil. Soils that are high in clay content may hold substantial amounts of potassium. Some soils are as high as 2% of total potassium, but the vast majority of this potassium is held in the mineral lattice and is not plant available. Most of the available potassium in clay soils is adsorbed to inorganic colloids. Sandy soils tend to not hold potassium well because they typically have few colloids and have low cation exchange capacity. Organic soils have organic colloids, thus they can hold substantial amounts of potassium.

Since most soils, including cranberry soils, can't release enough potassium from the minerals to meet plant needs, growers apply fertilizers containing potassium to their crops. When the fertilizer prills land on the soil they dissolve in the soil water and the individual ions begin to diffuse through the soil in the liquid fraction of the soil. Plant roots will take up some of the potassium ions quickly. Others will adsorb to soil minerals and colloids and re-establish the equilibrium between the solid and liquid soil fractions. Much of the applied potassium remains in the upper layers of soil for a time and is available for plant uptake.

Because potassium is not held tightly on the soil it can also be washed into deeper layers of soil below the root zone. This is called leaching. When irrigation is provided beyond what is required to fill the soil profile water moves downwards through the soil and carries nutrients held in the soil solution with it. Further, as water is added to the system the equilibrium of potassium held in the liquid fraction (soil solution) and potassium held on soil exchange sites changes so that more potassium moves into the soil solution. Leaching is undesirable because expensive nutrients are lost and may become environmental contaminants.

Even though soil may contain significant amount of potassium, not all of the potassium in the soil is plant available. The potassium that is plant available is adsorbed to soil particles or is held in the soil solution. As plants take up potassium from the soil solution, adsorbed potassium is released into the solution to retain an equilibrium. When excess water from either rainfall or irrigation moves through the soil potassium may be washed below the root zone in the water effectively making that potassium plant unavailable.

Teryl Roper, UW-Madison Extension Horticulturist

Never act toward someone as through you were never going to come across him again in life. . . . Never sacrifice what the future may hold for some immediate gain. Be yourself with everyone you meet – but be your best self, for you can be sure that before you have lived out your life you are going to meet again. . . . You always meet people a second time.

Samual Goldwyn

SPRING FLOODING FOR INSECT CONTROL

Is it possible for cranberry insect pests to survive a flood? Have you ever seen larvae/worms wearing a snorkel or scuba gear? Me either!!!!

Let's talk about flooding for insect control this spring.

In 2007 a fair number of growers experimented on their own marshes. Some flooded the entire marsh while others chose to be more selective because of cultivar differences and plant stages. Growers experimented with vines being under water for 10 – 16- 20 - 24 – 36 and 48 hours. In our observations it appeared to be more effective to flood for 24 to 40, with 36 hours as a goal. I personally did not scout marshes that were under for 48 hours, I believe those marshes were under the supervision of my colleges, I can not share with you my observations.

In 2007 the buzz word was that flooding did INDEED control the 1st generation of Cranberry Pests. Yet many questions followed....with the main emphasis on; "Even though we know the insects were controlled, did we have crop reduction because of the flood?"

We carefully monitored one particular marsh because it was flooded the longest and conditions were **not** typical. The flood waters were dark, murky, and warm, due to excessive windy conditions and unfortunately the days were sunny and the nights were pleasant without any frost protecting. The flood did not come off as quickly as the grower had intended therefore it was on for at least 40 hours. When the vines and soil was dry enough to resume scouting we did not find economic levels of concern and as a matter of fact it was difficult to find anything in the larval stage. We maintained control right up until Cranberry Fruit worm challenges (from May until July). In addition to that, we were pleasantly surprised to discover that as the season progressed the sparg flights were noticeably lower than non flooded areas. In 2006 the sparg flight peaked with 125 in the flooded area and in 2007 we peaked with 108 while a bed nearby that was NOT flooded peaked in 2006 with 121 and in 2007 peaked at 221! NOW, that is noticeable.

We did notice that the plant stage was slower than the unflooded areas. This lethargic growth lasted a few weeks but then things caught up and remained strong for the growing season – Yes we harvested at the same time as other beds plus the crop was favorable.

So in 2007, the crop in Stevens vines was not affected by 40 hours of flood waters.

Here are some of grower comments on flooding for insect control:

1) Timing is everything – look for a cool, cloudy stretch with possible frost watch.
2) Amazing to see dead worms align the dike. Awesome to witness the number of birds that swarmed the flooded beds to feed.
3) Plant stage is vital – My Ben Lear are more advanced than my Stevens vines so I am not sure if the hook would survive underwater for 36 to 48 hours? I chose not to flood my Ben Lear.
4) Remember that flooding with the pipes already in the beds creates

a bit of a challenge – floating, disconnecting etc.

5) Trash layers are inevitable and clean up may take a few extra hours depending upon how much you flood. Disease pressure may be less because of the clean up.
6) Even though my Stevens vines were slower to start, they actually caught up and the crop was right up there with the rest of the marsh.
7) I flooded areas that I did not use granular forms of herbicide as I wondered just where the herbicide would be after the flood.
8) I had an early infestation of spanworm and I allowed them to get a bit large before I flooded because I wanted to get the Sparg hatch as well. I did not have to take any other means of control after my 36 hour flood until July when the CFW hatched out. My insect populations were at an all time low.
9) I was targeting the Blueberry Looper/Black Spanworm but as a bonus I was shocked at how many June Beetles my crew and I forked up with the trash layers. Let me tell you it was REAL HARD WORK as we wanted to get as many of the beetles out of the beds as possible. We are anxious to see just what the populations look like **this** June. We have tried chemicals against White Grub/June Beetles but nothing we tried worked, so if this decreases the populations it may very well be another cultural practice we could bring back.
10) I would encourage my fellow growers to do sections of the marsh. If this is your 1st try at flooding for insect control, you might be surprised at how much time it takes to flood and then take the flood off. As far as insect control, it was amazing.
11) With new herbicides in place I am not afraid of flooding for insect control because I won't spend the money on granular herbicides and fear that it was in vain – washed away from the weed seed or root zone.
12) I find that flooding is weather dependent. I would never hesitate to flood the marsh during cold spells as a means of frost protection and if it would only coincide with insect control I would be willing to leave it on for 36 to 48 hours knowing it does indeed work. Typically I find that in cool/cold springs insects are not present until much later so the flood would not control my target pests. Again, it depends upon the weather and how my plants are growing.

Take home message. You will never know how flooding works unless you are willing to try. I have never seen larvae/worms doing the back stroke on flooded beds. Flooding works....

Jayne Sojka, Lady Bug IPM

The life of a small group of people, who live true to their convictions, does more and more certain good than all writings. Let us, therefore, young and old, direct all our actions as much as possible towards the realization of our convictions in our life.

Tolstoi

ALL-TERRAIN VEHICLE (ATV) SAFETY

ATVs have become popular for work and recreation on many farms and ranches. Unfortunately, reported cases of serious injury and death have increased along with their increased use. Most of these injuries and deaths can be attributed to improper use of ATVs. Make ATV safety a priority on your farm or ranch.

- An ATV is not a toy. Children should not be permitted to operate ATVs without specialized training and then they should be allowed to only operate an ATV of an appropriate size. Contact the ATV Safety Institute to enroll in a course.
- ATVs with an engine size of 70cc to 90cc should be operated by people at least 12 years of age.
- ATVs with an engine size of greater than 90cc should only be operated by people at least 16 years of age.
- Wear appropriate riding gear: DOT-, Snell ANSI-approved helmet, goggles, gloves, over-the-ankle boots, long-sleeve shirt and long pants.
- Read owners manuals carefully.
- ATVs are not made for multiple riders. Never carry anyone else on the ATV.
- Any added attachments affect the stability, operating and braking of the ATV.
- Just because an attachment is available doesn't mean that it can be used without increasing your risk of being injured.
- Do not operate the ATV on streets, highways or paved roads.

Inspection

- Are tires and wheels in good condition?
- Are controls and cable operational?
- Does the chain have proper slack and is it lubricated?
- Is riding gear (including a helmet) available and worn?

Information supplied by the National Safety Council's Agricultural Division.

LUNG CANCER IN THE AGRICULTURAL HEALTH STUDY

Lung cancer is one of the most frequently diagnosed cancers in the world, and it is the leading cause of cancer death. The major cause of lung cancer is cigarette smoking. It is estimated that cigarette smoking is associated with over 85% of all lung cancers in the U.S., but other factors are known to cause this disease. As a group, farmers in the United States smoke less than the general population and, as a consequence, usually experience a significantly lower risk of lung cancer than the general population. The Agricultural Health Study (AHS) includes 57,311 pesticide applicators and 32,347 spouses of farmer applicators from Iowa and North Carolina. From 1993 through 2001, 300 study participants were diagnosed with lung cancer—240 among pesticide applicators and 60 among spouses. Based on general population rates, over 600 lung cancers would have been expected. In other words, pesticide applicators in the Agricultural Health Study and the spouses of farmer applicators had half the risk of lung cancer compared to the general population. Historically lower smoking rates among farmers (currently only 14% of farmers in the AHS versus 23% in the general population) undoubtedly contribute to the low rates of lung cancer. However, exposures encountered while performing various farming related tasks may lead to higher risks for lung cancer among some members of the cohort than others. It is important to understand why some study participants get lung cancer and others don't. This will help researchers learn about other possible risk factors for lung cancer in addition to smoking.

Risk Factors for Lung Cancer

Smoking and older age were associated with lung cancer risk in the AHS just as they

are everywhere. Other factors associated with lung cancer in applicators included a history of pneumonia or other chronic lung diseases like bronchitis and emphysema, occupational (off the farm) exposure to asbestos and lead, and fewer years of school. Unlike other chronic lung diseases, asthma was not associated with lung cancer. Among spouses, age and smoking were significant risk factors for lung cancer, but a history of pneumonia or other chronic lung disease was not.

High fruit and vegetable consumption, moderate alcohol consumption, and higher leisure-time physical activity low cancer risk in spouses somewhat l among the applicators.

Examining Lung Cancer and Pesticide Use

Fifty pesticides were evaluated for a possible role in the development of lung cancer. No association between lung cancer in spouses and direct use of any of the 50 pesticides was found. However, among applicators, some evidence was found when comparing lung cancer in the non-exposed group to those who were in four higher exposure categories for two widely used insecticides, *chlorpyrifos* and *diazinon*. For *metolachlor* and *pendimethalin*, two important herbicides, a lung cancer risk was observed but an elevated risk was limited to those in the group with the most days of use in a life time.

When compared to applicators who had never used these chemicals, those who had used *metolachlor* over 457 lifetime days had a four-fold risk of lung cancer. For those who had used *pendimethalin* more than 225 days, their risk was 3.5 times greater for developing lung cancer. A substantial percentage of AHS applicators was exposed to at least one of the four pesticides. This lung cancer risk was observed even after taking into account a history of cigarette smoking, age, gender, and total days of any pesticide application. The AHS is the first to report a possible link between some of these pesticides and lung cancer. It is still too early to say for sure that these pesticides cause lung cancer. Replication of these results through continued follow-up in the AHS cohort or in other studies is necessary before any firm conclusions can be reached. Nonetheless, it is always a good idea to use caution when handling pesticides.

From: *Agricultural Health Study. Iowa State University and North Carolina State University cooperating.*

Let us be kind to one another, for most of us are fighting a hard battle.

Ian Maclaren

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