Bermuda Agriculture - Summer 2024 Newsletter

Agronomic Consultant

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Update on Plant Parasitic Nematodes in Bermuda Agricultural

I just wanted to follow up on species molecular identification on some of the plant-parasitic nematodes I collected. We are working on these as we have time.

We have identified two root-knot nematode populations so far.

The population from the beans growing in the planter boxes is southern root-knot nematode *Meloidogyne incognita*. This is the same species that was reported in the 1967 survey.

The population from MO10, golf course fairway, was the northern root-knot nematode *Meloidogyne hapla,* a new species report for Bermuda.

I will keep you posted as we get more completed.

William T. (Billy) Crow, Ph.D.

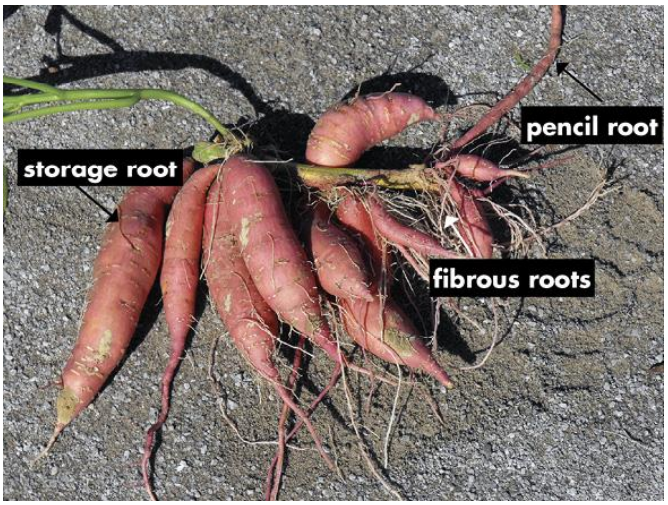
Professor of Nematology and Director of the Nematode Assay Lab

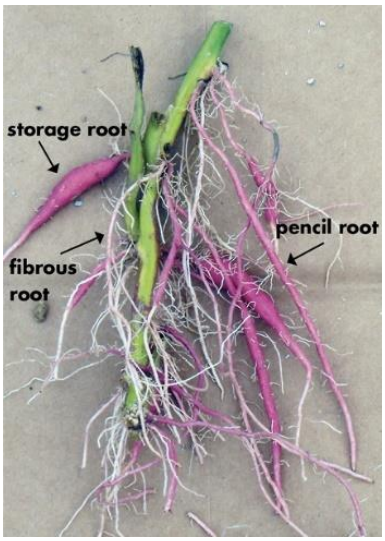
University of Florida Entomology and Nematology Dept.

Note: I have included some main points from some prior articles because they are important to keep in mind going forward with the up-coming season. I will also have some comments on each topic as we go through the issues that I want to stress. --- Stewart

Sweet Potato Storage Root Initiation

Sweet potato yields are ultimately determined by the **number of sweet potato plants** per acre, the **number of storage roots** per plant, and the **size of each storage root** at harvest. Under commercial production conditions, fields with identical plant densities that remain in the field for the same time may have drastically different yields. This is likely due to factors that affect storage root initiation and development. Unlike the bulking of sweet potato storage roots in the last third of the growing season, sweet potato **root number is determined early** in the production cycle. Current research has found that environmental and cultural conditions during the first 2 weeks to 30 days after transplanting are critical in deciding the number of storage roots initiated per plant.





Adverse or unfavorable environmental conditions shortly after transplanting may result in pencil root production (thin, elongated roots measuring less than four-fifths of an inch wide at maturity). To maximize marketable yields, it is important to achieve the greatest possible number of storage roots.

On this last trip I checked several sweet potato fields that were showing a lot of stress from the dry conditions that were present this spring. I believe that due to this early season stress that potential yields in these fields will be very low due to the fact that storage root initiation takes place so early after transplantation (see article above). I would ask that the farmers let me know if that assumption turns out to be correct. I would also, going forward, recommend that particular attention be paid to newly planted sweet potatoes during the first 30 days after transplanting (especially when it comes to irrigation). --- Stewart

Reniform Nematode Impact on Sweet Potatoes

As Dr. Crow mentioned, high levels of reniform nematodes were found in several sweet potato field in Bermuda. Reniform nematode is one of the most damaging plant-parasitic nematodes of sweet potato in the southern U.S. Upon infection, they feed on roots and greatly reduce the quantity, size, and quality of storage roots. In many cases, misdiagnosis occurs mainly because the foliage symptoms resemble nutrient deficiency or water stress, and reniform nematode infected roots do not produce visible symptoms.

The above photos show the high number of pencil roots and few marketable sized sweet potatoes in a field in Bermuda with high reniform nematode levels. The yield per acre in this field was a mere 12.5% of the yield from the original field from which the cuttings were taken.

The Following is from communications with a nematologist at LSU, who works primarily on sweet potato nematode issues. --- *Stewart*

Stewart,

The reniform nematode is our #1 nematode pest of sweetpotato in Louisiana, a state with a long history of sweetpotato production and development. Our survey work in Louisiana has shown that reniform is widespread throughout our state, and we see very high levels of population build up when sweetpotato is planted. With respect to management, we are actively working on developing strategies. **There are currently no resistant cultivars available**, but we do have a project to look for resistance. There are a number of nematicides that are registered for use on sweetpotato, and our work has demonstrated that in-furrow application of Velum and AgLogic 15GG can help (see attached paper). We have also performed a fair amount of work with soil fumigants, and they do provided the best level of suppression of all management tactics at the time of planting, but the nematode populations rebound quite rapidly in the fumigated soil. Rotation to a non-host crop (corn, grain sorghum, etc.) can certainly help bring the populations down, but they also build up quite rapidly once sweetpotato is planted back into the field again.

I find that one of the main problems with reniform nematode management on sweetpotato, or any crop for that matter, is that many growers are unaware that they have this problem without sending in soil samples for diagnostics. There are no definitive symptoms on the crop, other than lower than normal yields. Many of our growers associate nematodes solely with gall formation (root-knot nematode species), and we are working on an educational campaign to address this issue.

Let me know if you have any follow up questions.

Regards,

Tristan Watson, PhD
Assistant Professor
Department of Plant Pathology and Crop Physiology
LSU AgCenter

The nematode survey we did on island showed that in every vegetable field tested, some level of reniform nematodes were present. My fear is that the planting of any good host crop in these fields could lead to a large increase in the nematode population and a resulting decrease in yields and profits. After receiving this email, I looked in to the pesticides that were most promising in his research: AgLogic 15GG and Velum.

The active ingredient in AgLogic is aldicarb, which is a highly toxic carbamate that has an acute toxicity due to oral, dermal, and inhalation, as well as a significant potential for ground water contamination. It also has a 6 to 8 month plant back restrictions for most of the vegetable crops grown in Bermuda. For these reasons aldicarb would not be suitable for use on the island.

Velum is fluopyram, which is considerably less toxic than aldicarb and is labeled for most of the crops grown in Bermuda. It has essentially no plant back restrictions, it also has some fungicidal properties, and can be applied through drip irrigation. (see label below) This product might warrant further analysis for its possible contribution to pest control in Bermuda. --- Stewart DG13222 Velum Prime Nematicide Fungicide Label_EN (bayer.ca)

Weed Control Comments

In the last year and a half, I have made many comments on the lack of weed control in the farm fields and the effect on yields. Weeds compete with the crop for nutrients, light and (the most limiting factor in Bermuda) water. The increasing use of plastic mulch and particularly where drip irrigation is present is a great best management practice that conserves water and reduces weed pressure. Weeds between the rows must still be controlled as they **will** be competing with the crop!

Sweet potatoes being grown on plastic with drip irrigation and weed free row middles.

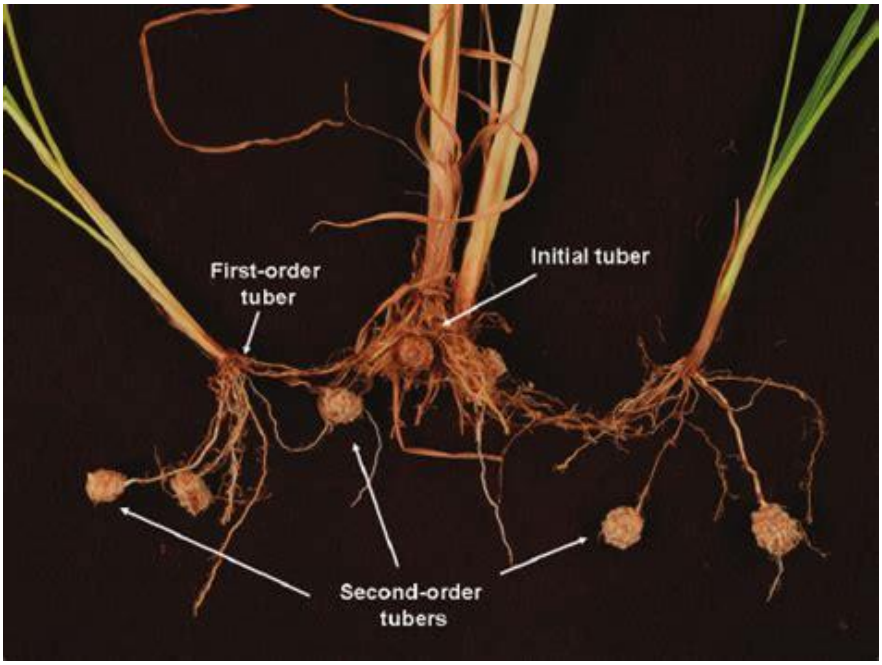

Peppers, tomatoes and eggplant being grown on plastic with drip irrigation and weed free row middles. The above photos represent what we should be striving for, i.e. efficient water usage, fertigation and the lack of weed competition.

Plasti-culture is very helpful in weed control, but some weeds can still manage to ruin one's day!


Above are photos of a pepper field that is infested with nutsedge that is penetrating and growing right through the plastic mulch. On the right it is quite apparent that besides taking up nutrients and water the nutsedge is robbing the sunlight necessary for photosynthesis from the crop. The sedge also hinders the easy removal of the plastic mulch.

Fallow Control of Nutsedge

Yellow nutsedge produce tubers, which are incorrectly called "nuts". The plants produce these tubers on rhizomes, or underground stems, that grow as deep as 8 to 14 inches below the soil surface. Buds on the tubers sprout and grow to form new plants and eventually form patches that can range up to 10 feet or more in diameter.



Nutsedge is also an excellent alternative host for nematodes. Nematode populations tend to increase rapidly in fields where nutsedge is prevalent.

The existence of the tubers makes this weed impossible to control using cultivation alone. Few herbicides will control nut sedge growing in with a crop. It is advisable to try and reduce the weed population during fallow periods. Recommendations for repeat applications of roundup to control nutsedge during the fallow period call for a **rate of 2 pints per acre of Roundup Ultra (41% active ingredient)**. The nutsedge is sprayed at the 4 to 6 leaf stage and disked in after it has browned up. This will kill the emerged plants and some of the of the tubers. After the sedge dies down the field should be disked which will encourage another flush of sedge from the tubers, and then a second application of herbicide should be employed. Usually, three such cycles are usually enough to gain control of the sedge population.

Roundup Math Revisited

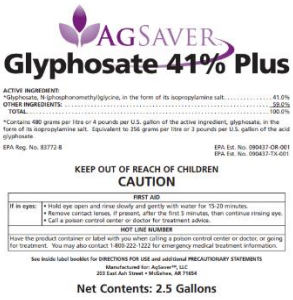
I took a photo of 33 gallons of ready to use (2%) Roundup (glyphosate) at a grower's establishment. The grower didn't have a permit to import this herbicide and bought this product locally at the cost of $55.00 per gallon.

Let's do a little math: $55/gal. X 33 gal. = $1,815.

33 gal. X 8.34 lbs/gal = 275 lbs

33 gal X .02 (glyphosate concentration) = 0.66 gal glyphosate

Compare to a widely available concentrated (41% glyphosate) product.



0.66 gal glyphosate / 0.41 concentration = 1.6 gal.

(1.6 gal X 8.34lbs/gal = 13 lbs)

1.6 gal. X $18.76/gal = $30

$1,815 - $30 = $1785 (60 times the cost when compared to the U.S.)

What is the cost of shipping 275 lbs. vs 13 lbs. (you are really shipping mostly water!)???? Not to mention the increased storage area needed and the trash stream represented by 33 empty plastic gallon jugs.

Let's do a little more math related to controlling nutsedge with 3 fallow roundup sprays:

2 pint of a 41% concentrated roundup is equal to 41 pints of the ready to use product available in Bermuda. That is 5.13 gallons needed per acre. If it indeed takes three separate applications, then you would need ¾ of a gallon of the 41% product or slightly over 15 gallons of the ready to use roundup.

$55/gal. X 15 gal/acre = $825/acre.

$18.76/gal. X ¾ gal/acre = $14.07/acre. (based on U.S. price per gallon)

(60 times the cost when compared to the U.S.)

Tordon RTU (Picloram) and Composting Issues

Tordon on a local business's shelf.

I am including this information because I am concerned about the widespread use of Tordon in the landscape management sector. If it is being used somewhat extensively, there is a potential for vegetable crop damage if the locally available compost is used as a soil amendment on farmers' fields.

Minute concentrations of picloram, clopyralid and aminopyralid, as low as 1 ppb (parts per billion), can be lethal to sensitive garden plants such as peas, eggplant, beans, peppers, carrots, lettuce, spinach, tomatoes and potatoes.

Most pesticides, including herbicides, break down quickly in the composting process. Picloram, Clopyralid and Aminopyralid do not. These chemicals are

- Easily absorbed by plants.
- Remain chemically stable and intact in both live and dead plants.
- Do not breakdown substantially in animal digestive tracts so contaminate manure, urine and bedding with residues.
- Breakdown very slowly in composts and soils with an estimated half-life of 1 - 2 years.
- Affect sensitive crops at very low concentrations - 1-3 ppb.

The only way to handle this potential threat is to keep materials contaminated with picloram, clopyralid and aminopyralid out of your garden in the first place.

Live Plant Pathogens Can Travel on Dust Across Ocean

Study provides computer modeling evidence to support the idea that massive dust storms can transport viable pathogenic spores across continents.

ITHACA, N.Y. — Plant pathogens can hitch rides on dust and remain viable, with the potential for traveling across the planet to infect areas far afield, a finding with important implications for global food security and for predicting future outbreaks.

A study, "Assessing Long-distance Atmospheric Transport of Soilborne Plant Pathogens," published Sept. 25 in the journal Environmental Research Letters, is the first to provide computer modeling evidence to support the idea that massive dust storms can transport viable pathogenic spores across continents and oceans.

The Earth system model simulated a major dust storm, nicknamed "Godzilla," that brought some 24 million tons of dust from North Africa across the Atlantic Ocean to the Caribbean and southeastern United States in summer 2022.

The researchers found that viable spores of the deadly fungal plant pathogen Fusarium oxysporum (F. oxy) could be transported across the ocean and were likely deposited across a

range of regions that include agricultural production zones, most significantly in southeastern Louisiana, Mexico, Haiti and the Dominican Republic, with particularly high risk in Cuba.

The researchers also looked at intercontinental transport, areas closer to the source – where spores might be airborne for less time – that likely received the majority of the viable spore depositions.

Soil-adapted F. oxy is found on all six crop-producing continents and can infect more than 100 crops and other plants, leading to losses of up to 60% of crops and hundreds of millions of dollars in some areas.

As a result, understanding how fungal diseases spread and identifying agricultural zones where viable spores could deposit is vitally important to ensure global food security, according to the paper.

The study was funded by NASA. *See below for the whole article.*

Live Plant Pathogens Can Travel on Dust Across Oceans | Morning Ag Clips

Wild flamingos blown into US from Hurricane Idalia

September 5, 2023

Bird enthusiasts are flocking to see flamboyances of flamingos popping up all over the eastern U.S. after they were blown in by Hurricane Idalia. More than 150 of the pink wading birds have ended up in unlikely states like North and South Carolina, Virginia, and even Texas and Ohio, since Hurricane Idalia passed through the U.S. last week.

Bird watchers in a flurry over 'rare' incursion of wild flamingos blown into US from Hurricane Idalia - ABC News