

Auglaize County OSU Extension Weekly Agriculture Newsletter – November 6, 2019

Scouting and Latest Information



Harvesting soybean



Harvesting corn

Hello!! Good afternoon! I pray you are well. Most received a nice dose of rain for the wheat and cover crops.

If you are a buyer and need some hay or have hay to sell, let me know. Call the OSU Extension office at 419-739-6580.

Field work is happening again after the rains.

Joke: Why do cows like being told farmer jokes???

Rain fell 3 day this past week. Rainfall on Wednesday, October 30th ranged from 0.7” at about 2 miles north of St. Marys to 1.5” at about 6 miles northwest of St. Marys. Rainfall on Thursday ranged from 0.06” at Santa Fe – New Knoxville and Kettlersville Roads to 0.8” at about 2 miles north of St. Marys. Rainfall on Saturday ranged from 0” at my place, 3 miles north of St. Marys and just north of Kossuth to 0.025” on Buckland – Holden road and West of St. Rt. 501. Rainfall for the week ranged from 0.97” at Kettlersville and

Santa Fe – New Knoxville roads to 2.0” at about 6 miles northwest of St. Marys. Average rainfall for the week was 1.48”. Temperatures were above and below normal for the week.

Tasks for the week included: fall tillage, hauling manure, harvesting corn and soybean crops, harvesting forage, and tiling fields.

I drove a section of the county on Sunday.

Wheat – Wheat quality looks pretty good, although there was a time period that was too dry and stands are suffering in those fields.

Alfalfa – Alfalfa is close to being dormant. After next week it will be dormant and herbicide applications can be made at that time.

Corn – All corn is at the R6 (black layer) stage. Only about 50% of corn has been harvested in the county as of Sunday. I’m hearing yields from 130 to 265 bushels per acre. Last year at this time 69% of the corn was harvested. Get out and harvest the corn as it is lodging quite frequently. I left the corn condition the same again this week since we are so close to harvest. The condition last week was 2% excellent, 14% good, 74% fair, 10% poor and 0% very poor.

Soybean – Soybean growth stage should be at R9 (all pods brown). About 93% of soybeans have been harvested in the county as of Sunday. Yields are ranging from 37 to 68 bushels per acre with the average around 57 bushels per acre. Last year 91% of soybeans were harvested at this time so we are ahead of last year.

Weeds – Scout wheat fields for weeds. Scout fields for winter annual and biennial weeds. Even though temperatures have been in the mid-twenties, herbicides can still be applied during warmer periods. It is better to spray on a day of 35 degrees F, although not preferred, than to not spray at all in the fall. Remember by next spring winter annuals could be producing seeds and the marestail becomes more difficult to control in the spring rather than the fall.

Insects - In my last observation for brown marmorated stink bug, I found only 0.67 per trap.

There were changes to the XtendiMAX and Engenia labels. There were NO changes to the FeXapan or Tavium labels. The Engenia label still has the most approved products compared to XtendiMAX and FeXapan. No new herbicides were added to the XtendiMAX label this past week, which totals 152 herbicides. No new adjuvant was added the XtendiMAX label, now totaling 344. Eleven new nozzles were added to the XtendiMAX label, which totals 37. No new Drift Reducing Adjuvant (DRA’s) was added to the

XtendiMAX label this week, making a total of 58 DRA's. No new nutritional products were removed from the XtendiMAX label which totals 203. No new products were added to the Insecticides, Fungicides, Plant Growth Regulator and Other group on the XtendiMAX label which totals 61. Three new adjuvants were added to the Engenia label, which now totals 485. No new herbicides were added to the Engenia label, which brings the total herbicide count to 144. No new products were added to the Other category (growth regulators, and fungicides) on the Engenia label, which totals 29. No new insecticide were added to the label which currently has 28 products. No new Drift Reducing Adjuvants (DRA's) were added to the Engenia label, which totals 105. No new nozzles were added to the Engenia label, which totals 29. No new nutritional products were added to the Engenia label which totals 177 products. No new product was added to the pH Modifier group of the Engenia label which totals 16 products. The FeXapan label has many of same the products and nozzles as the XtendiMAX label, but NOT all are the same, so check the FeXapan label carefully. There are 120 herbicides, 49 DRA's, 312 adjuvants, 151 nutritionals, 44 insecticides, fungicides, and others, and 26 nozzles that have been approved for the FeXapan label. There are 13 herbicides, 66 DRA's, 181 adjuvants, and 41 nozzles approved for use with Tavium.

Answer to joke: Because the farmer said, "Hogwash"!

Ohio Soybean Performance Trials now Available



The 2019 Ohio Soybean Performance Trial data is now available. It is only available in a pdf format and only contains yield data at this time. Soybean quality data will be added later. The purpose of the Ohio Soybean Performance Trial is to evaluate soybean varieties for yield and other agronomic characteristics. The website address to find this report is as follows: https://stepupsoy.osu.edu/sites/hcs-soy/files/2019%20Yield%20Pub_1.pdf

Tables are laid out by region and maturity. There are three regions, north, central, and south and there are two location for each region, except for the north as one location was not planted. The maturities are separated into early (2.5 to 3.3) and late (3.4 to 4.4) in the Central region. The two closest Performance Trials to Auglaize County are Mercer and Morrow Counties, both in the central region. The varieties are listed from the highest average yield of the two sites to the lowest of both sites. The highest yielding variety for a specific location is designated by 2 asterisks (**). Varieties marked with a single asterisk (*) are statistically similar to the highest yielding variety within that location, so they are not different. There is also data presented for an average yield over a two year period if submitted each year.

The trials contained Roundup Ready (1 and 2), LibertyLink (LL), Non-GMO (conventional), Enlist, LibertyLink/GT27 (LL/GT27), and Xtend soybean varieties. There are three Xtend varieties that also contain the STS trait. The trial was designed to have each of these types of varieties in a single trial so they could be compared equally. Therefore conventional herbicides were used to control weeds at each site so the four types of varieties could be compared.

There were 177 varieties entered in 2019 compared to 175 in 2018 and 227 in 2017 from 18 companies (20 in 2018 and 23 in 2017). In total there were 93 (107 in 2018) Xtend varieties, only 5 (25 in 2018; 58 in 2017) Roundup Ready varieties, only 3 (26, in 2018; 38 in 2017) LL varieties, 32 Enlist varieties, 28 LL/G27 varieties and 14 (17 in 2018) conventional varieties submitted to the trials. Five of the Xtend varieties were stacked with the Sulfonylurea Tolerant Soybean (STS) trait.

For the Central Region in the early maturity group, Seed Consultants SC3330L (LL variety) had the highest yield at both locations! Only six varieties were statistically similar at the Mercer County location and 17 at the Morrow County location of the early season maturity group. Of the six statistically similar varieties at Mercer County, one was LL, one was Roundup Ready, and four were Xtend varieties. Of the 17 statistically similar varieties at Morrow County, one was LL, one was Roundup Ready, and 15 were Xtend varieties. The two highest yielding soybeans for a two year period in the Central region of early maturity soybean were Seed Consultants 9339R, a Roundup Ready variety and Ebberts Field Seeds Ebberts 319R2X, a Xtend variety. The highest yielding varieties in the Central Region in the late maturity group were Advanced Genetics, Inc. 3601RX, a Xtend variety at Mercer County and Dyna-Gro Seed S34GL79, a LL/GT27 variety at Morrow County. The variety with the highest average yield for both sites was Ebberts 2037 E3, an Enlist variety. Twenty-six late season maturity varieties were statistically similar at Mercer County location with 16 being Xtend, four Enlist, four LL/GT27, one Roundup Ready, and one conventional. Eleven late season maturity varieties were statistically similar at the Marrow County location with four being Xtend, three LL/GT27, two Enlist, one LL, and one Conventional. The top two highest yielding soybean varieties for a two year period in the Central Region of late maturity soybean were Ebberts 388R2X, a Xtend variety and Dyna-Gro Seed S37XS89, a Xtend plus STS variety.

Two of the top five early maturity varieties in the north showed up in the top 12 of the Central region list. None of the top five late maturity varieties from the north were also present in the Central region list. Three of the top five early maturity varieties in the south was also in the late maturity list for the Central region. Three of the top five late maturity varieties in the south were also in the late maturity list for the Central region. Dyna-Gro S37XS89, a Xtend plus STS variety and Seed Consultants SC 9339R, a Roundup Ready variety were the most consistent high yielding soybean variety in all trials and years.

Choosing varieties based upon the greatest yield is the first step to choosing varieties. After that you need to look at disease resistance traits and other agronomic traits that best matches the soils and environmental conditions for your fields. Varieties that do well at multiple locations and for multiple years should be adaptable to many different locations and environments and should be strongly considered.

C.O.R.N. Newsletter

<https://agcrops.osu.edu/newsletter/corn-newsletter>

Ohio Corn Harvest May Continue as a High Moisture Corn Harvest



Corn in Field

When the calendar flipped from October to November the weather changed in a big way. Over the next 10 days, temperature predictions are highs in the 40's and lows in the 20's. These conditions make it much more difficult to field dry corn creating a need to send high moisture corn to the dryer. Currently only 37% of the corn crop has been harvested compared to a 5 year average of 56%. Using a dry down calculator from Iowa State (<https://crops.extension.iastate.edu/facts/corn-drydown-calculator>), we can estimate how quickly corn will dry in the field. Based on the forecast, if your corn is at 30% moisture now, in 10 days it will be about 25% moisture and by the end of the month it may reach 21%. If our current moisture is 25%, in 10 days it will be about 22% moisture and by the end of the month it may reach 20%. When looking at these numbers, it seems like corn is field drying well. However, if we look at the forecast for corn at 20% now, the calculator predicts a moisture loss of less than half a point over the next 10 days and less than a point by the end of the month. Keep in mind, these are median predictions and if the weather model changes, we could see more-or-less field dry down.

As the weather turns cooler, it can become much more difficult to manage wet grain. It also becomes more difficult to determine moisture since most moisture meters are not accurate when grain temperature falls below 40 F. In order to get an accurate moisture estimate, put a grain sample in a sealed container and let it warm to room temperature and retest moisture. It is also recommended that you allow the corn coming out of the drier to cool to room temperature before testing moisture, especially if the tester is kept in a cool area. Also, keep in mind that you may need to adjust harvest logistics to account for longer transport times since corn above 28% moisture may freeze together and corn between 24-27% moisture often binds and will not flow properly from wet storage bins and trucks.

Now comes the challenges of drying high moisture corn in high temperature dryers. The high moisture corn will spend more time in the dryer, increasing its chances of browning. The high temperature air over a longer period during fast drying and cooling often creates stress cracks and broken kernels leading to a lower test weight and issues with storage. Most high temperature dryers are run at about 210 F. One way to reduce kernel damage in wet grain is to decrease the temperature below 200 F even though it will take longer to dry. Unfortunately, lower temperatures are not as efficient at drying. It takes 4,000 BTU to remove a pound of water at 150 F but only 2800 BTU at 200 F. Keeping dryer plenum temperatures as high as possible without damaging grain is ideal. Monitor the grain coming from the dryer for cracks and decrease temperatures until quality is maintained. As temperatures decrease below 40 F, the chances of condensation forming when hot grain is put into storage bins increases. Grain coming out of a high temperature dryer should be at 90-100 F to reduce the condensation potential. If your bins have large enough aeration fans, cooling the rest of the way in bin can also help improve grain quality. When hot grain is fully cooled to 30 or 40 F, the amount of stress cracks increases. During cooler temperatures it is even more important that the corn is cooled at its fill rate or faster. It takes an air flow rate of 12 cfm per bushel coming into the bin in an hour to keep up with cooling.

Increased dryer condensation can also cause issues. As the condensation cools during freezing night time temperatures, vents may become iced over decreasing efficacy and causing damage. If you are using a dryer

bin, these vents freezing over could cause roof damage. To avoid this, leave all access doors open or close with an elastic strap that can act as a pressure relief.

If your corn crop was frost killed, another layer of challenges has been added. When corn is frost injured, a moisture tester will often read lower than actual grain moisture. The outer portion of the kernel dries faster than the interior. This grain is usually 1-2% wetter, even after drying than your moisture tester reads. In order to handle this, grain needs dried to 12-13% and fully cooled. It also takes more energy per percent moisture to dry this grain. Frost killed corn will have a lower test weight decreasing storage life.



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Corn Harvest

Across the Midwest, more corn has been coming off wet using high quantities of propane and starting to cause shortages in some areas. While there is not a lot you can do about the supply side, you could contact

your propane supplier about how much more gas you may need this fall. While each drier and temperature has a different efficacy, a common estimate is that it takes 0.02 gallons of propane to remove 1% point from a bushel of grain. If your corn is averaging 25% at harvest, you will need to remove 9.5% to dry it to 15.5% taking 0.19 gallons of propane per bushel or 190 gallons per 1000 bushels.

Even after drying, high moisture corn often has more fines due to more aggressive shelling and drying. These fines increase storage issues leading to corn going out of condition sooner. The fines can fill in voids decreasing airflow, causing hot spots and increased potential for insect damage. These fines can cause issues in the dryer leading to a greater potential for dryer fires. This can be managed in a couple ways. Fines produced in the combine can be removed using a drum grain cleaner before the grain enters the dryer. The high moisture corn is often much more fragile after drying so even if combine fines are removed, there is still a major concern for in bin fines. The first step to protecting damaged grain from insects is to cool it below 20-25 F, for most insects. Make sure the grain is cooled throughout by taking temperatures 12 inches into the grain at the top from multiple areas of the bin. After cooling bins, they should be cored to remove fines that accumulated in the center of the bin. During coring, about half of the peak in the bin should be removed creating a cone. If a cone is not created, the grain is bridging, and you should NOT ENTER the bin. If you have multiple bins, it is recommended that you sell the corn that was dried from the highest moisture first.

For the producers who use natural air drying, this will be much more complicated as air temperatures fall below 40 F. When temperatures are in the 30 to 40 F range, it will take over 2 months for this corn to dry in the field. In bin drying should not be attempted if corn is over 20% moisture. Below 20% moisture, the grain can be cooled to 20-30 F using aeration and left in the bin until spring temperatures are over 40 F and can be dried at that point. This grain should not be stored any longer than absolutely necessary after drying in the spring. Adding heat to natural drying bins can improve drying, but only slightly. The greatest improvement in natural drying time comes from increasing airflow. Adding heat can allow the final moisture of corn to improve on average due to higher relative humidity. If you can naturally dry corn in the winter it is only to about 16%.

For more information visit:

<https://www.ag.ndsu.edu/graindrying/documents/high-moisture-corn-drying-and-storage-pdf>
<https://www.ag.ndsu.edu/news/newsreleases/2009/oct-26-2009/drying-high-moisture-corn-can-be-tricky/>
<https://crops.extension.iastate.edu/blog/charles-r-hurburgh-mark-licht/harvest-consideration-frost-killed-corn>

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Where's the Bean? Missing Seed in Soybean Pods



Stink Bug Damage to Soybean (photo courtesy of ocj.com)

As soybean harvest progresses, a few growers are noticing poor yields in otherwise nice-looking plants and pods. While a visual inspection might lead to high estimations of seed quality, the inside may contain shrunken, shriveled or, even worse, missing seed. Stink bugs can often cause this type of injury to soybean seed. They have piercing sucking mouthparts that poke through the pod wall, and then feed directly on the seed. Because their mouthparts are small, damage to the pod is often undetected. However, opening a few pods may reveal poor seed quality evident of stink bug feeding. We have seen increasing issues with stink bugs in Ohio. This past season was no exception and we will likely continue to see issues in the future. For more information on stink bug identification, scouting and resources, see our agronomic crops insects webpage: <https://aginsects.osu.edu/home>

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Other Articles

USDA rolls out its hemp rule: is Ohio ready?

By: Peggy Kirk Hall, , Associate Professor, Agricultural & Resource Law , Associate Professor, Agricultural & Resource Law Thursday, October 31st, 2019

By Peggy Kirk Hall and Ellen Essman

Source: <https://farmoffice.osu.edu/blog/thu-10312019-930pm/usda-rolls-out-its-hemp-rule-ohio-ready>

Legalized hemp production in the U.S. took a major step forward today with the publication of the USDA's rule establishing the "U.S. Domestic Hemp Production Program." States and potential hemp growers have been awaiting this rule since the Farm Bill legalized hemp back in December 2018 but required that regulatory programs be established for overseeing hemp production. Today's hemp rule sets up the regulatory framework for state departments of agriculture, Indian tribal governments and the USDA to license producers who want to grow hemp as a commodity crop.

What's in the hemp rule?

The hemp rule lays out the requirements for establishing Hemp Production Plans within States or Tribal governments and creates a USDA administered licensing program for producers in areas that choose not to regulate hemp production. Other parts of the rule include definitions, appeal provisions, and reporting requirements. The rule also addresses the interstate transportation of hemp. Here's a quick summary of provisions that affect Ohioans.

Requirements for State and Tribal Hemp Production Plans. A State or Tribe must include the following in a Hemp Production Plan that the USDA must approve before the State or Tribe can allow hemp production within its borders:

- *Plans to maintain relevant producer and land information.* A state must collect, maintain and provide USDA with contact and location information for each licensed hemp producer, including personal information about the individual or business and location information about the land where hemp is produced.
- *Plans for accurate and effective sampling and testing.* A plan must include procedures for collecting hemp flower samples; conducting sampling and testing of plants 15 days prior to any harvest; ensuring that sampling methods are reliable and represent a homogeneous composition of the sampling area; preventing commingling of plants from different sampling areas; requiring that producers are present during sampling; and allowing samplers to have unrestricted access to hemp plants and all land and facilities used for cultivating or handling hemp.
- *Procedures to accurately test THC levels in samples.* The rule lays out suggested reliable testing methods but does not establish a single, national testing procedure for determining whether a hemp plant falls beneath the 0.3 threshold for THC, the psychoactive ingredient that distinguishes hemp from marijuana. However, a State or Tribe must use a testing lab that is registered with the Drug Enforcement Agency and must require the lab to follow testing performance standards. The standards must include

evaluation of “measurement of uncertainty,” a concept similar to determining the margin of error, and must account for the uncertainty in THC test results.

- *Procedures for disposal of non-compliant plants.* A State or Tribal plan must prohibit any handling, processing, or entering the stream of commerce of any hemp grown in an area that exceeds the acceptable THC level and must have procedures for disposing of the plants, verifying disposal, and notifying USDA of non-compliant plants, including provision of test results to USDA.
- *Inspection procedures.* A plan must include procedures for annual inspections of random samples of licensed producers.
- *Reporting procedures.* A plan must explain how a State or Tribe will submit all of the information and reports required by the rule, which includes monthly producer reports, monthly hemp disposal reports, and annual reports of total planted, harvested, and disposed acreage. The plan must also require producers to report crop acreage to the Farm Service Agency.
- *Corrective action plans.* A required corrected action plan will address procedures for allowing producers to correct negligent regulatory violations such as failing to provide a legal description, failing to obtain a license, and exceeding the THC level. The procedures must include a reasonable compliance date, reporting by the producer for two years after a violation, five years of ineligibility for producers with three negligence violations with a five-year period, and inspections to ensure implementation of corrective action plans.
- *Enforcement for culpable violations.* A plan must have procedures for reporting any intentional, knowing, willful or reckless violations made by producers to the U.S. Attorney General and chief law enforcement officers of the State or Tribe.
- *Procedures for addressing felonies and false information.* The plan must not allow a producer with a felony conviction relating to controlled substances to be eligible for a hemp license for a period of ten years from the felony conviction, and must prohibit a producer who materially falsifies information on an application to be ineligible for a license.

Plan review by USDA. The rule states that after a State or Tribe submits a hemp plan, USDA has 60 days to approve or deny the plan. The rule also allows USDA to audit approved state plans at least every three years.

Interstate commerce of hemp. The rule reiterates an important provision first mentioned in the 2018 Farm Bill: that no state can prohibit transportation of hemp or hemp products lawfully produced under an approved state plan or a USDA license.

USDA issued licenses. A producer in a state that chooses not to regulate hemp production may apply to the USDA for a license to cultivate hemp. The USDA’s sets forth its licensing program requirements in the rule, which are similar to provisions for State and Tribal Hemp Production Plans.

Effective date: today

It’s important to note that the USDA published the rule as an “interim final rule” that becomes effective upon its publication in the Federal Register, which is today, October 31, 2019. Federal law allows an agency to forego the typical “notice and comment” period of rulemaking and publish a final rule if there is good cause for doing so. USDA explains that good cause exists due to Congress’s interest in expeditious development of domestic hemp production, critically needed guidance to stakeholders who’ve awaited

publication of the hemp rule, previous outreach efforts, and the public's interest in engaging in a new and promising economic endeavor. The immediacy of USDA's rule allows the agency to begin reviewing State and Tribal Hemp Production Plans now, in hopes that producers will be able to plant hemp for the 2020 growing season. USDA is seeking public input on the interim final rule for the next sixty days, however, and plans to consider such comments when it replaces the interim final rule with a "final rule" in two years time.

Is Ohio ready?

While Ohio's Department of Agriculture (ODA) won't be the first in line to have its hemp production program reviewed under the new USDA program, Ohio won't be too far behind the twenty states and tribes that are already [awaiting review](#). ODA proposed Ohio's hemp regulations earlier this month after the General Assembly decriminalized hemp and authorized the agency to develop a hemp program in July of this year via [Senate Bill 57](#). The USDA rule comes just one day after ODA closed the comment period on the proposed rules, which we summarize [here](#). Once ODA publishes the final hemp regulations, it can proceed to submit Ohio's Hemp Production Plan to the USDA for approval. Ohio's timing may prove beneficial, as ODA now has the opportunity to review the USDA rule and ensure that Ohio's plan will meet the federal requirements.

Our comparison of Ohio's hemp laws and regulations to the USDA's hemp rule indicates that Ohio is well prepared to meet the hemp rule requirements. Only a few provisions in the federal rule may require additional attention by Ohio before ODA submits its plan for USDA approval. Key among those are procedures for THC testing methods (technical details not included in Ohio's proposed regulations) and procedures for corrective action plans (which are not clearly laid out in the proposed regulations but are addressed in Senate Bill 57). One potential conflict between the federal and Ohio rules regards destruction of hemp plants that exceed the allowable 0.3 THC level. The federal rule prohibits any further handling, processing or entering into the stream of commerce of any hemp plants from the sampling area and requires disposal of non-compliant plants, while Ohio's regulations allow bare hemp stalks for fiber that is free of leaf, seed and floral material to be harvested, processed and used while all other material from plants that exceed 0.3 THC must be destroyed. We'll soon see how ODA handles these and other issues when it submits Ohio's Hemp Production Plan for USDA approval.

Read the interim final rule on "Establishment of a Domestic Hemp Production Program" [here](#), which is also the site for submitting comments on the rule. USDA will accept public comments until December 30, 2019.

Helping hands from within: Live-in bacteria protect plants against infections

Date: November 1, 2019

Source: Netherlands Institute of Ecology (NIOO-KNAW)

Source: <https://www.sciencedaily.com/releases/2019/11/191101124618.htm>

Micro-organisms living inside plant roots team up to boost the plant's growth and tolerance to stress. An international research team led by the Netherlands Institute of Ecology (NIOO-KNAW) and Wageningen UR reports its discovery in today's issue of the scientific journal *Science*.

Certain species of 'resident' bacteria can protect plant roots against fungal infections. Researchers from the Netherlands (Wageningen, Leiden, Rotterdam), Brazil, Colombia and the United States made this discovery using metagenomics: a form of DNA-technology that analyses genes from an environment to reveal the previously hidden diversity of the local microbial community.

"It's without precedent that we were able to reconstruct the composition and functions of this community in plant roots based solely on DNA-sequencing," says the study's last author and research leader, Jos Raaijmakers from NIOO-KNAW.

Sustainable crop production

"Bacteria are essential to the functioning of plants, animals and people," argues Raaijmakers. "Our main goal was to discover micro-organisms inside roots that are recruited by the plant when it's under attack from fungal pathogens. Our study represents a big step forward for developing more sustainable crop production systems, with fewer pesticides."

So what exactly happens in plant roots when they're on the verge of being infected? The researchers found out that 'helping hands' inside the roots begin producing all kinds of useful substances. Chitinases, for example: enzymes that break down the cell walls of attacking fungal pathogens.

This discovery allowed the researchers to develop tailor-made microscopic backup troops for plants, using *Chitinophaga* and *Flavobacterium* species. Experiments on sugarbeet consistently proved the effectiveness of this approach in suppressing fungal infections of the roots.

Genetic treasure trove

"The micro-organisms living in the roots also turned out to have a wealth of hitherto unknown genetic properties," says Raaijmakers. New software, developed by researchers at Wageningen University & Research (WUR), facilitates the comparison of the DNA of thousands of species at once.

Using this method, the researchers found more than 700 unknown gene clusters that produce unique substances. Only twelve had so far been recorded in worldwide databases. Raaijmakers: "We have discovered a real treasure trove of properties of which we do not even know the function yet. This is only the tip of the iceberg."

The NIOO researcher stresses that these discoveries were only possible because of the study's multidisciplinary approach: "It included ecologists as well as microbiologists, molecular biologists, bio-informaticians and statisticians."

The team's research is part of the BackToRoots-project, which received funding from the Dutch Research Council's AES Domain (Applied & Engineering Sciences). BackToRoots aims to enhance plant growth and productivity by exploring beneficial microbial communities, including ones found in wild ancestors of our present-day crops.

With more than 300 staff members and students, the Netherlands Institute of Ecology (NIOO-KNAW) is one of the largest research institutes of the Royal Netherlands Academy of Arts and Sciences (KNAW). The institute specialises in water and land ecology. As of 2011, the institute is located in an innovative and sustainable research building in Wageningen, the Netherlands. NIOO has an impressive research history that stretches back 60 years and spans the entire country, and beyond.

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