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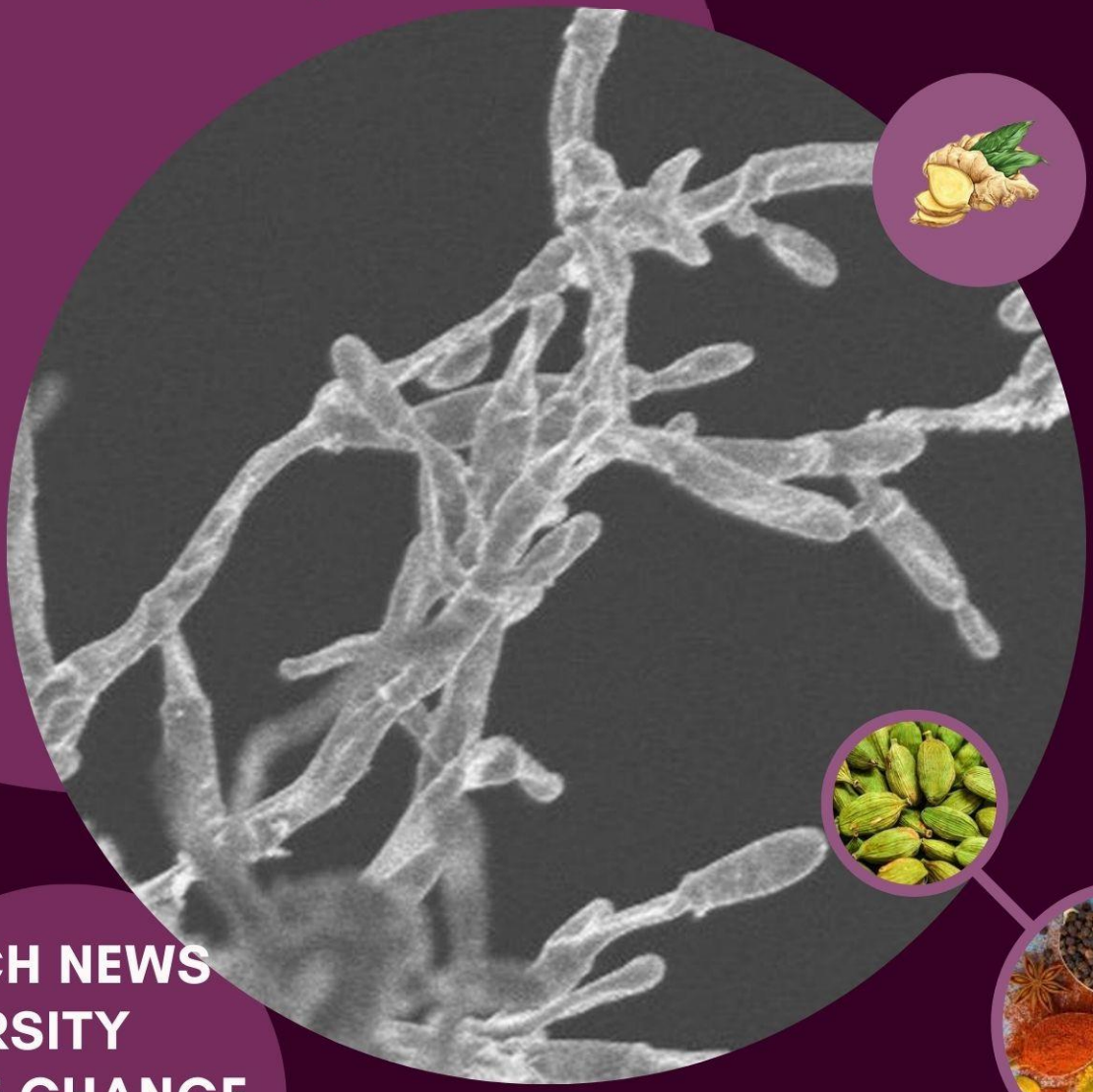
AGRI Titbits

Monthly bulletin of Agricultural News



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Agri Titbits is an effort to collect and preserve agricultural news, especially spices, appearing in newspapers and online media.

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Compiled & prepared by Jayarajan K

ICAR - Indian Institute of Spices Research

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The Water Test to Determine If Your Turmeric Is Pure

APRIL 16, 2023 WWW.TASTINGTABLE.COM

Once relegated to curries here in the U.S., turmeric (fresh and dried) is now booming. The Southeast Asian spice from the Curcuma longa plant has appeared in blogs, cookbooks, and medical websites worldwide; this cousin of ginger has online influencers singing its praises, not just for its unique flavor profile or the vibrant yellow patina it lends to every dish, but also for its health benefits. (Remember the "Golden Milk" craze?)

Used in Ayurvedic medicine for thousands of years for everything from inflammation to arthritis, turmeric contains a pigment called curcumin. Found within its rhizome (rooty structure), curcumin dissolves in fat and is what gives turmeric its distinctive deeply yellowed color, along with all those health benefits. It's also one of the leading reasons for its dangerous adulteration with toxic contaminants.

So, where are those contaminants coming from? For one, the soil it's grown in. In places like India, (where most turmeric is sourced), the ground has been so severely contaminated with lead, it's classified as a public health crisis (via Pure Earth). But there's also intentional adulteration with chalk or starches, according to Vasant Masala. These fillers increase the amount unscrupulous purveyors can sell and because these pale imposters can be easily identified, they're then treated with synthetic dyes (Sudan I, Sudan II, Metanil Yellow, and Orange II) and metal/mineral chromates like lead to boost the color.

How to perform the water test

While a myriad of tests can be done to determine the purity and safety of turmeric (most of which require chemicals to complete) the easiest and most effective to do at home is the water test. You'll just have to be willing to sacrifice a little of this yellow ochre-hued spice to the water gods. Fill a glass with room-temperature water and add 1 teaspoon of turmeric on top of the water in the glass, taking care not to stir the spice. Let it sit for 15 to 30 minutes. If the turmeric has settled to the bottom of the glass, with no change in color, leaving the water clear or only lightly tinted, your turmeric is pure. If your water is cloudy, opaque, darkly yellow, or has little to no turmeric on the bottom of the glass, you can assume there's been some adulteration and that it should not be ingested.

Armed with this simple test, you'll be able to protect yourself and your family from contaminants like lead and choose turmeric purveyors who prioritize purity. Now, go enjoy your golden milk!

Cumin prices hit eye-watering ₹600/kg as spice inflation bites

APR 18, 2023 WWW.HINDUSTANTIMES.COM

A silver lining is that farmers are getting a fair share of the market price due to a twist in how the spices market functions.

Inflation has set the spice route ablaze and cumin (jeera), a widely consumed condiment, is the costliest food ingredient in the Indian kitchen at ₹560- ₹600 a kg, thanks to the climate crisis. Experts say changing weather patterns in Rajasthan, India’s largest spice grower, have upended the demand-supply balance, and a that large deficit of cumin has sent demand soaring. The silver lining is that farmers are getting a fair share of the market price due to a twist in

how the spices market functions. Essentially, as one farmer put it, farmers have beaten traders at their own game.

Consumer inflation in spices rose 18.21% in March, the highest among components in the retail food basket, latest official data show. In Unjha, the nerve centre of India's spice trade in Gujarat, prices of cumin shot to over ₹40,000 a quintal (100kg) last week, market data shows.

As harvests of the winter-sown condiment were under way, estimates by the Federation of Indian Spice Stakeholders (FISS) showed the overall area under cumin in Gujarat and Rajasthan grew by nearly 13% from a year ago and the average yields were expected to be higher by 13.2% from last year.

Farmers disputed this because ground reports showed extreme weather shrivelled cumin, a grain-based condiment. "A month ago, the industry and traders predicted a 26% surplus. That didn't look right," said Bhagirath Choudhary of the South Asia Biotechnology Centre, Jodhpur, Rajasthan.

Choudhary, whose firm works for cumin quality development under a central government programme, said he suspected traders were inflating output to cut wholesale prices and squeeze farmers' margins. Quite simply, when supply increases, prices decrease.

Choudhary's firm did a survey of crops on behalf of cumin growers and found that inclement weather had not just shrunk output but also yields by nearly a third.

The ensuing demand-supply mismatch that has driven cumin prices to a record high proved the impact of weather. "So, farmers were armed with their own data, which is rare, leading to the right price discovery," he said.

Cumin is sown from October and arrival of crops at the Unjha wholesale market begins around early March.

"A big gap in demand-supply scenario has taken prices of cumin to an all-time high," said Dinesh Patel, chairman of the Unjha agricultural market produce committee.The crop loss is greater in Rajasthan than Gujarat and prices are almost

double than in the corresponding period last year,said Ashwin Nayak, president of FISS, adding that they would revise their output estimates.

Soaring prices aren't the only bad news for consumers. Choudhary, a farm scientist working on cumin, says he has noticed unusual weather changes in western Rajasthan, the heart of spice-farming in India.

"Winters are getting shorter and a western warm wind has started blowing in from Pakistan (bordering western Rajasthan) right at the germination stage of cumin crops around early February. This didn't happen until a few years ago," Choudhary said.

Farmers are battling newer and more intensive pest infestation as a result, he said, calling for climate crisis mitigation.

Against a total demand of 800,000 bags (55kg each), cumin output this year is estimated to be around 550,000 bags, a drop of 31%. "Unseasonal rains have also led to loss in production in Rajasthan and Gujarat," Patel of the Unjha market said.

However, FISS says its report did not factor in losses caused due to rains in February and March and that it would revise its estimates. Choudhary disputes this and said: "Overestimation is neither beneficial to industry nor to farmers."

The spot-prices rally has had a knock-on effect on futures on NCDEX, an agri commodities futures exchange, where they are trading higher by about 77% from last year. Futures (short for futures contracts) are contracts to buy the commodity at a certain price at a future date.

Syria and Turkey were once considered India's closest rivals in cumin in the global market. Geopolitical changes and other reasons have forced the two to lower their output and exports.

There is renewed demand for cumin from China which had stopped buying the commodity for last few years due to Covid curbs, said Patel of Unjha APMC.

"The price hike could be a result of speculation in futures trading. There is new arrival of jeera crop and some are trying to artificially jack up the prices. With Turkey deciding to remove jeera from its list of irrigation crops, India has an

advantage in exports," said Yogesh Mehta, chairman of World Cloves Council and member of Taskforce Committee Seeds and Spices formed by Spices Board of India.

Saffron Surge

3 APR, 2023 WWW.GREATERKASHMIR.COM

The per hectare production of saffron in J&K has increased manifold, bringing cheers among the saffron growers who had been constantly seeing decline of the crop which is famous across the world. It is a spice that comes from the stigmas of the purple flowers of the plant Crocus sativus.

Each flower contains three stigmas that are handpicked and then dried to make the saffron spice.

It takes thousands of flowers to produce a few grams of saffron. The stigmas are typically of an orange-red colour, which is due to the content of crocetin, a type of acid and crocin.

Pampore meadows attract tourists from everywhere to witness the yellow, maroon, and purple hues of the blossoms that bloom beside giant Chinar trees and harvest time resembles a festival for the villages in the area.

On the first day of the harvest, saffron farmers head to the shrine of Hazrat Sheikh Sharifuddin in Namblabal Pampore to offer some saffron.

According to growers and officials, the National Saffron Mission, which was launched in 2010 played a pivotal role in the substantial increase in the saffron production and officials are hopeful that the coming years would bring more good news for the saffron growers.

In fact, if saffron farmers in Kashmir smile, that means over 16,000 families are happy.

According to the 2011 census, approximately 16,000 families, including 11,000 women, in Kashmir are associated with saffron cultivation.

In 2020, Kashmir set a record when saffron production crossed 13 metric tonnes in 10 years.

Though the J&K's Agriculture Department is yet to calculate the exact numbers, this year, production is expected to break that record.

Farmers say that the production this year is roughly 25-30 percent higher than the previous years.

Saffron is one of the world's most expensive spices and is known as the king of condiments.

It fetches between Rs 1.5 lakh and Rs 2.5 lakh per kg.

"The corm production is good and the plants are getting better. The stigma of the flower is bigger. The overall crop is better. Last year, I harvested 100 tola (1 kg) of saffron and this year it is expected to cross 1.5 kg," says a young farmer whose family owns around 35 kanal of saffron fields in the district.

Director Agriculture Kashmir Choudhary Mohammad Iqbal told Greater Kashmir that this year the department was expecting a jump in production.

Saffron output in Kashmir, which mostly is cultivated in Pampore in south Kashmir's Pulwama district near the Srinagar-Jammu National Highway crossed 13.36 tonnes in 2020, the most in a decade, which, to a large extent, is attributed to the introduction of a government scheme – National Saffron Mission – to rejuvenate the cultivation of the spice.

The mission brought scientific know-how, underground irrigation, and a spice park to rejuvenate the production and post-production processes.

"Last season we had a bumper crop due to which growers earned good money and this year we expect good production and stability in the markets," Iqbal said.

Recently, the J&K government acknowledged that the production of saffron per hectare had gone up during the last harvest.

A government spokesman said that from 1.88 kg production per hectare, the production now had reached more than 4.5 kg per hectare and officials were hopeful that it would go further up in the coming years.

Saffron growers said that the results of the National Saffron Mission were showing now.

The government said that the annual yield of saffron in Kashmir crossed 13 metric tonnes in 2020 for the first time in 10 years and increased with each passing year. The production was quite encouraging during the last harvesting season year due to favourable temperature and initiatives undertaken by the government.

Kashmiri saffron was given a Geographical Indication (GI) tag by the geographical indications registry.

The request was filed by the Directorate of Agriculture, J&K government, and facilitated by the Sher-e-Kashmir University of Agriculture Sciences and Technology, Kashmir (SKUAST-K) and Saffron Research Station, Dussu (Pampore) with the aim to make it illegal for someone outside Kashmir to make and sell a similar product under the "Kashmiri saffron" name.

Arthritis: Does Turmeric Relieve Joint Pain And Inflammation?

APRIL 12, 2023 WWW.INDIA.COM

Arthritis can make it challenging for a person to carry out daily tasks due to the condition's limitations on joint motion. Arthritis makes simple activities uncomfortable, such as sitting or bending. A person with arthritis must take numerous precautions in order to lessen discomfort and swelling. One can incorporate turmeric into your diet to control arthritis. Did you know that curcumin, which is turmeric's main component, can ease pain and lessen inflammation? The excellent health advantages of turmeric

are worth mentioning in addition to the flavouring they provide to food. You may find it difficult or terrible to go about your everyday activities if you have arthritis, a chronic health condition that can result in excruciating joint pain and inflammation. Turmeric or Haldi powder has anti-inflammatory effects that can help ease joint pain.

HOW TO ADD TURMERIC TO YOUR DIET?

You can sprinkle turmeric on vegetables and rice, add it to soups and smoothies, or buy it in the form of a powder (ground from the root).

Arthritis patients can also try turmeric tea to alleviate joint pain.

Turmeric powder can be used in salads or curries. You may find turmeric in some of the foods you eat that are yellow, such as mustard.

The best approach to add curcumin to your diet is through curcumin pills and capsules.

Even though rheumatoid arthritis and osteoarthritis are distinct ailments, they both have a very comparable impact on the body, mostly by inducing pain and inflammation near the joints. However, it's not known if turmeric works for rheumatoid arthritis sufferers in the same way that it does for osteoarthritis patients. If you have either of these problems and are considering taking turmeric, consult a pharmacist.

If you decide to use turmeric for your arthritis, keep in mind that it shouldn't be viewed as a substitute for other medications, particularly ones that your doctor has prescribed.

Growing black pepper for health and profit

APR 14, 2023 WWW.MB.COM.PH

Filipino cuisine has been gaining recognition on the world stage, and just like any other cuisine, there are some secrets to it. One of those secrets is black pepper, known locally as paminta. Adobo, touted to be the country's food icon, is one of

the Filipino dishes that is seasoned with black pepper. The following are also liberally spiced with black pepper: pork menudo, afritada, pata hamonado, pesang isda, nilagang baboy, paksiw na bangus, and bulalo.

This versatile spice appears in many forms such as powdered, crushed, or using the whole peppercorn itself. It's been touted as the "king of spices," providing a flavor profile of honey and citrusy notes. Black pepper contains the following vitamins and minerals: vitamin A, thiamine (vitamin B1), riboflavin (vitamin B2), pantothenic acid (vitamin B5), vitamin B6, manganese, copper, iron, calcium, phosphorus, potassium, selenium, zinc and chromium.

Black pepper, which comes from the Sanskrit word pippali and known in the science world as Piper nigrum, was once known as black gold. It has one of the longest histories as a sought-after spice, due to its ability to flavor foods, act as a preservative, and add heat to a dish.

Local cultivation

Unknown to many Filipino farmers, black pepper – being a tropical plant – can be grown profitably in many areas of the country where the soil is well-drained and fertile. It can be planted as a boundary crop.

Black pepper, however, grows better under partial shade than in an open field, a characteristic that makes the plant good for backyard farming. It can also be grown between coffee and cacao trees. Most black pepper farms are found in Batangas, Laguna, Quezon, Negros Occidental, Zamboanga and Davao.

"There are four varieties of black pepper," says the Davao-based Mindanao Baptist Rural Life Center (MBRLC) Foundation, Inc., referring to large-leafed, small-leafed, tall, and short. "You can plant any of these varieties in your farm or backyard."Since black pepper is a creeping plant, it needs posts to climb on. Commonly used support trees - which are planted ahead of time - include ipil-ipil

(Leucaena leucocephala), madre de cacao (Gliricidia sepium), and dapdap (Erythrina variegata). The supports must be at least three to four meters high, 2.5 meters between rows.

Here are more tips on growing black pepper from the MBRLC:

Black pepper can be propagated with cutting or with seeds. The latter is not recommended for commercial purposes. But either way, it's necessary to have a propagation bed where the cuttings can be rooted or the seeds germinated and nursed to transplanting age. The seedling bed should be of fine, rich soil and should be located in a shaded area. It should constantly be kept moist—not too wet and not too dry—at all times until the plants are ready for transplanting.

Transplanting and propagation

Only the berries that are orange or red in color are harvested for seed propagation. The berries should be picked only from vigorous, disease-free plants of the desired variety. It is a common practice to place the seeds in a cloth bag and soak them in water for two to three days before sowing. The seeds are sown in the bed six inches apart in rows and covered with fine soil about two inches thick.

The seedlings are ready for transplanting when they are about one-year old. In transplanting, it is advisable to retain as much of the soil clinging to the roots as possible. A reminder: Plants raised from seeds grow more slowly and require more care than plants grown from cuttings.

Cuttings for propagation should be taken from vigorous, heavy-yielding plants which are below the node and 20 inches or more in length, with plenty of roots at their joints. "Remove side branches," MBRLC advises, "because they don't climb, but sprawl."

The cuttings are inserted into the soil of the bed in a slanting position with half their length buried. Cuttings are ready for transplanting when they show vigorous growth

and are fully rooted. In transplanting, the seedlings should be “balled” or provided with plenty of soil clinging to their roots.

Black pepper can also be propagated by means of marcotting. Here are the steps: From the tip of a black pepper branch, look for the node with whitish aerial roots that are less than a centimeter long. Enclose the node in a container. Tie it securely to the support. A tin can, waxed paper cup, or a plastic bag can be used as a container for the marcot.

The container is filled with fine, dry humus or sandy loam soil. “Pour in a little at a time until it reaches the length of the internode just above the node to be marcotted,” MBRLC recommends. The marcotted seedling is watered lightly. The soil should not be pressed against the delicate roots.

After a month, the young marcot is cut from the mother plant. The stem is cut very close to the container using sharp pruning shears or a knife. The newly-cut marcot is placed in a bigger container such as a clay pot or a plastic bag. The delicate roots should not be disturbed. The marcot is then hardened by placing it in partial shade for three to four months. Watering it excessively is not recommended.

Planting

The rooted seedlings are transplanted at the start of the rainy season. Two or three seedlings are planted a few centimeters away from the base of each support tree. Before placing the plants in the prepared holes, the plastic bags are removed carefully so that the plants and soil are still holding together.

Black pepper should not be allowed to grow tall. As the vines climb the support poles, the tops should be pulled down as they reach the desired height of two to three meters. Every three months, manure or compost is applied to each hill to maintain plant growth. In addition, pests and diseases attacking the plants must be controlled. Weeding must be employed, too.

Black pepper starts to bear fruit, called peppercorn, as early as the first year after planting. Peppercorns mature in 5 to 6 months. The whole spike is ready for picking

when the peppercorns in a spike turn cherry-red, turn from dark green to shiny yellowish green, or when they have a brownish cotyledon when pinched.

Generally, the first harvest of peppercorn, which varies from one-half to one kilogram per plant, is in its third year. Full production comes in the sixth or seventh year (the yield is approximately 1.5 kilograms per plant) and the plant produces continuously for 15 or more years.

The fruits on a bunch do not all mature at the same time. In backyard growing, only the mature ones are harvested and the green immature berries are left to be harvested later on. In commercial plantations however, to facilitate harvesting, the operation should be delayed until almost all fruits on a bunch have matured. Then the whole bunch could be gathered in a simple operation instead of picking the individual fruits one by one as they mature.

Black pepper yields both black and white pepper. The black peppercorn seen in the market is black pepper dried under the sun or solar radiation to 12% moisture content. The peppercorn is spread on mat and the spike removed, then peppercorn is winnowed, cleaned and stored in sacks.

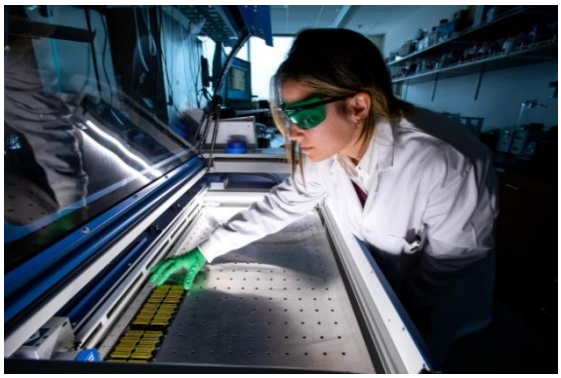
To produce white pepper, the ripe berries are removed from spikes, then placed in bags and soaked in water. After soaking, the berries are allowed to ferment before the outer hull is removed by hands or by treading on berries with feet. The smooth, white kernels are immediately washed and dried.

When included in one's farm plan, black pepper can be a good addition to one's harvest, and therefore, profits.

RESEARCH NEWS

Innovation at Work: Smarter farming with better data

APR 18, 2023 WWW.NEWS.IASTATE.EDU



For more than 150 years, Iowa State University scientists have helped support agricultural production. It's a foundational mission, present from the start and persisting to this day. In a broad sense, the goal of that research hasn't changed. Farmers who know more grow more.

But the advances in precision and digital agriculture that Iowa State researchers are creating for modern agricultural operations are focused more than ever on information. Successful farming is increasingly fueled by data and automation, innovations that can boost yields and profits while improving sustainability. Often by building their own products or partnering with companies, ISU researchers give farmers tools for making better decisions.

"We're trying to reduce risk, to reduce stress, and to use technology to make farming more resilient," said Matthew Darr, professor of agricultural and biosystems engineering.

Instant insight.

An EnGeniousAg sensor shows the nitrogen level in a corn stalk within seconds. Photo by Christopher Gannon/Iowa State University. Larger image.One of the vexing decisions farmers face is how much nitrogen to

apply to their crop. Nitrogen is an essential nutrient for plant growth, and farmers often use fertilizer to ensure their crops have enough nitrogen to thrive. That's especially important for corn, which can't pull nitrogen from the air as soybeans do. But there are major downsides to applying too much fertilizer or at the wrong time. Nitrogen that washes away can overstimulate algae growth in rivers and lakes, choking off bodies of water and polluting drinking water. It's also a financial drain for farmers.

"Getting the optimum nitrogen rate for corn is very important because right now it's the most expensive input cost for producing corn, which has among the highest input costs of any major global crop," said Michael Castellano, professor of agronomy. But it's difficult to forecast ideal rates, which can vary from field to field and from year to year within the same field, he said.

Soil testing provides insight, but collecting samples for lab testing is labor-intensive and time-consuming. Affordable sensors that quickly and accurately measure nitrogen levels would help farmer get closer to perfecting their fertilizer rates and make it easier for them to use conservation-minded practices such as applying before and after planting. That's the goal of two research teams at Iowa State who have designed nitrogen sensors they plan to commercially release as early as next year after field testing this summer.

Castellano is one of the co-founders of EnGeniousAg, a startup whose other founders include Patrick Schnable, distinguished professor of agronomy and director of the Plant Sciences Institute; Liang Dong, professor of electrical and computer engineering; and James Schnable, professor of agronomy at the University of Nebraska-Lincoln. EnGeniousAg's handheld sensor measures the concentration of nitrate, a nitrogen compound, in the stalk of a plant. Detecting nitrate levels in a plant should improve accuracy of fertilizer recommendations as compared to using soil tests, because it is a measure of how much nitrogen has been absorbed instead of how much is available. Farmers also appreciate the speed.

"You stab it and get your reading within seconds," said Dong, whose research produced two patents EnGeniousAg licenses to create the device.

A team headed by associate professors of mechanical engineering Carmen Gomes and Jonathan Claussen has partnered with Van Wall Equipment, an Iowa-based equipment dealer, to add nutrient sensors to an existing moisture monitoring probe. Integrating their Nutriprobe device with Van Wall's Aquacheck soil moisture sensor offers constant remote monitoring of nitrate and ammonium, another nitrogen compound plants absorb from soil. The probe is designed to stay in the ground for an entire growing season.

Both sensors rely on ion-selective membranes that repel all but certain molecules, the ions of interest, then measure the voltage of what passes through the membrane to detect the concentration. Claussen and Gomes mount their membrane on plastic circuit boards that have been charred with a laser engraver to cheaply and easily create graphene, a single-atom thick form of carbon renowned for its strength, stability and conductivity.

Getting to market

Claussen and Gomes have worked to develop graphene-based sensors for a variety of other purposes – including COVID-19 testing and food safety – but the Nutriprobe has advanced the closest to hitting the market in part because of the expertise they've tapped by pairing with industry.

"It's been a great partnership because we understand graphene technology and ions, but Van Wall is one of Iowa's biggest John Deere dealers. They understand what farmers are looking for," Gomes said.

Gomes said working with Van Wall and farmers testing the device has clarified future research plans, which include a soil salinity sensor. They'll also continue to work on improving durability and production cost, which is currently less than $1 per unit. A practical outlook is natural for a sensor researcher, but developing a commercial product makes the inclination more urgent, she said.

"We have to think about the purpose of things. You don't want to invent a hammer that needs to look for nails," she said.

Iowa State's participation in a new federally funded center for soil health technology, SoilTech, is likely to lead to more private sector collaboration for Claussen and Gomes, who are co-directors of the ISU site for the industry-focused center.

"I think we're just on the cusp of the role sensors can play in driving down costs for farmers while addressing some of our environmental issues at the same time," Claussen said.

EnGeniousAg also has an industry partner in testing its nitrogen sensor. Premier Crop Systems, an Iowa-based precision agriculture company, plans to use the EnGeniousAg device in some of the nitrogen-rate experiments it is running with farmers. Soilview, a soil-sampling company, will test soil from the same plants to compare the cost and accuracy to conventional methods. EnGeniousAg already conducted an early round of testing with some volunteers from the Iowa Corn Growers Association, which prompted some adjustments, Patrick Schnable said.

"We learned that we need a very simple-to-use and rugged device. That has really guided development since," he said. "Farmers are not interested in reading a 20-page instruction manual."

Two Small Business Innovation Research grants – $100,000 from the U.S. Department of Agriculture and $225,000 from the National Science Foundation – have helped EnGeniousAg progress since its founding in 2018, as has institutional support from Iowa State's Innovation Corps and Startup Factory programs. EnGeniousAg has a full-time employee, Xinran Wang, an ISU graduate who worked on the probe as part of her doctoral research.

"We're really fortunate that Iowa State allows faculty time to engage in entrepreneurship activities," Schnable said. "Because this could have a huge impact on the world and for economic development in the state."

Constant collaboration

Working with companies on product development isn't a side project for Darr's Digital Ag Innovation team. Industry partnerships are the whole point.

"We don't set a specific research agenda. We adapt our research agenda to help partners be successful," Darr said. "We use engineering and science to solve complex problems within agriculture that ultimately add value – sometimes for farmers, sometimes for consumers, sometimes for the environment."

Matthew Darr with Ellen Barrett of John Deere, talking about the needs for college graduates in the high-tech ag industry. Photo by Buffy Clatt/ISU Research Park. Larger image.

The emphasis on private sector collaboration has produced results. In hundreds of projects over the past 15 years, Darr's team has generated more than 70 licensed patents and technologies – contributing to more than 30 commercial products, most related to farming equipment. The Digital Ag Innovation team typically accounts for about half of Iowa State's corporate-funded research.

A devoted approach to industry is somewhat rare for an academic research group, but Darr said it maximizes his team's impact, strengthening an important economic engine in Iowa and giving students valuable experience working with potential future employers.

"Iowa State doesn't sell tractors. We need to collaborate with partners who have the delivery mechanisms for our technology to reach farmers and impact agriculture," he said.

The 60-member Digital Ag Innovation team includes about 45 professional and scientific staff with backgrounds in engineering, design, data science, coding and agronomy. The team's work with corporate sponsors benefits from the continuity of professional staff while also creating unique experiences for graduate and

undergraduate students. Projects involve a level of cooperation and communication that enables high-impact outcomes.

“Most of our projects have a daily collaborative touch point between ISU and our industry partners as we work through the innovation process,” Darr said.

A second tenure-track faculty member, assistant professor of agricultural and biosystems engineering Bailey Adams, joined the team full-time in fall 2022 after earning his doctorate for research conducted with the group. He said the team’s work has three core areas of excellence:

Controls and automation, which often involves model-based software development

Algorithms and sensor technology, typically involving advanced signal processing

Digital agronomy, including remote sensing and high-definition plant management

“There are so many different flavors of autonomous systems across a wide variety of machinery platforms that our team is helping to develop,” Adams said. “The ultimate goal is to relieve the decision-making process for farmers by enabling intelligent control systems to evaluate job quality and autonomously make the proper adjustments for optimal performance.”

Noting that farm equipment has had auto-steer technology since the late 1990s, Darr likened his team’s automation research to efforts to optimize manufacturing processes. “When you’re driving a combine, you’re really driving a mobile factory. We’re perfecting how that factory operates, which is just as important as it is on an assembly line,” he said.

Model-based virtual engineering is an increasingly powerful tool in the search for those improvements, Adams said. It’s an efficient way to create, test and tweak designs before in-field verification. Modeling lowers development costs and keeps projects moving even in the winter when physical trials are limited if not impossible.

“That’s something our sponsors have more and more appetite for,” Adams said.

Keys to success

Senior engineering manager Alex Lassers came to work for the Digital Ag Innovation team after working with its researchers on numerous projects in his 15 years at John Deere, a frequent partner for Darr's group. He said companies value the team's flexibility in finding solutions to questions where there are more unknowns than knowns. Figuring out how to test and measure new technology is often half the battle, and initial concepts usually change.

"One of this team's core abilities is getting partners the data they can really trust when making big decisions. The thought leadership our team provides allows our partners to align data with company mission and business targets, which results in measurable performance," Lassers said.

Machine learning helps scientists identify the environmental preferences of microbes

28-APR-2023 WWW.EUREKALERT.ORG

Researchers have figured out a way to predict bacteria's environmental pH preferences from a quick look at their genomes, using machine learning. Led by experts at the University of Colorado Boulder, the new approach promises to help guide ecological restoration efforts, agriculture, and even the development of health-related probiotics.

"We know that in any environment, there's a ton of bacteria with important ecological functions, but their environmental preferences often remain unknown," said Noah Fierer, a fellow of the Cooperative Institute for Research in Environmental Sciences (CIRES) and professor of ecology and evolutionary

biology at CU Boulder. “The idea is to use this technique to figure out the basics of their natural history.”

Understanding whether certain bacteria are most likely to thrive in acidic, neutral, or basic environments is just a first step, said lead author Josep Ramoneda, a CIRES visiting scholar. “You could use this approach to anticipate how microbes will adapt to almost any environmental change,” he said. Say, for example, sea-level rise is bringing more saline water into a coastal wetland. “We can anticipate how microbes will respond to these environmental changes,” Ramoneda said.

The new work was published today in the journal *Science Advances*, and co-authors include others from CIRES and CU Boulder as well as colleagues from Canada.

Microbes, including bacteria, are critical to the functioning of ecosystems; helping plants grow, enabling nutrient cycling in lakes, and even supporting human digestion. But often, they’re impossible to isolate and grow in the lab, so we often know little about them, Ramoneda and Fierer said—except for their genetic makeup. Genetic “fishing” techniques of recent decades have led to exponentially growing databases of bacterial genomes.

So the research team drew on what scientists know about a few bacterial groups, which thrive at one particular pH or another, and then used machine learning to link those groups’ environmental pH preferences with their genetic makeup. The work involved sorting through the genomes of more than 250,000 types of bacteria from nearly 1,500 soil, lake, and stream samples.

“What we found is we can make inferences about their pH preferences based on genomic data alone,” Ramoneda said. For scientists, one of the finding’s most immediate implications is that it could help them grow colonies of finicky bacteria they’ve never been able to grow before, by giving them a first guess at what pH to use. It can take years to figure out how to “culture” bacteria so they can be studied in the laboratory and the machine-learning method could make that process far, far more efficient, Fierer said.

Agricultural and forestry experts also often add live bacteria to “inoculate” growing plants with helpful communities of bacteria, Ramoneda said. Now, they may get quicker, better insight into the types of bacteria that might help restore a native prairie vs. pine forests, or to better grow corn or soybeans, by ensuring that inoculants will be adapted to the local pH.

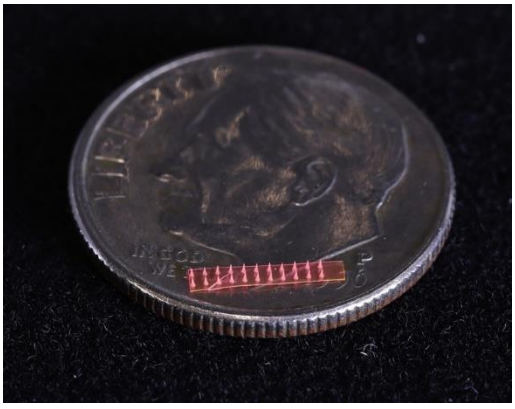
Next, the team plans to try to get insight into the temperature preferences of bacteria, another complex system likely involving many, many genes. That could help them better understand how warming will influence soil bacterial communities, for example.

“The alternative is to try to grow them all in the lab, and that’s painful,” Fierer said.

Funding for this work came from the Swiss National Science Foundation, U.S. National Science Foundation, Natural Sciences and Engineering Research Council of Canada, U.S. Department of Energy, and U.S. Department of Agriculture.

A new microneedle-based drug delivery technique for plants

APRIL 11, 2023 WWW.NEWS.MIT.EDU



Increasing environmental conditions caused by climate change, an ever-growing human population, scarcity of arable land, and limited resources are pressuring the agriculture industry to adopt more sustainable and precise practices that foster more efficient use of resources (e.g., water, fertilizers, and pesticides) and mitigation of environmental impacts. Developing delivery systems that efficiently deploy agrochemicals such as micronutrients, pesticides, and antibiotics in crops will help ensure high productivity and high produce quality, while minimizing the waste of resources, is crucial.

Now, researchers in Singapore and the U.S. have developed the first-ever microneedle-based drug delivery technique for plants. The method can be used to precisely deliver controlled amounts of agrochemicals to specific plant tissues for research purposes. When applied in the field, it could one day be used in precision agriculture to improve crop quality and disease management.

The work is led by researchers from the Disruptive and Sustainable Technologies for Agricultural Precision (DiSTAP) interdisciplinary research group at the Singapore-MIT Alliance for Research and Technology (SMART), MIT's research enterprise in Singapore, and their collaborators from MIT and the Temasek Life Sciences Laboratory (TLL).

Current and standard practices for agrochemical application in plants, such as foliar spray, are inefficient due to off-target application, quick runoff in the rain, and actives' rapid degradation. These practices also cause significant detrimental environmental side effects, such as water and soil contamination, biodiversity loss, and degraded ecosystems; and public health concerns, such as respiratory problems, chemical exposure, and food contamination.

The novel silk-based microneedles technique circumvents these limitations by deploying and targeting a known amount of payload directly into a plant's deep tissues, which will lead to higher efficacy of plant growth and help with disease management. The technique is minimally invasive, as it delivers the compound without causing long-term damage to the plants, and is environmentally sustainable. It minimizes resource wastage and mitigates the adverse side effects caused by agrochemical contamination of the environment. Additionally, it will help foster precise agricultural practices and provide new tools to study plants and design crop traits, helping to ensure food security.

Described in a paper titled "Drug Delivery in Plants Using Silk Microneedles," published in a recent issue of Advanced Materials, the research studies the first-ever polymeric microneedles used to deliver small compounds to a wide variety of plants and the plant response to biomaterial injection. Through gene

expression analysis, the researchers could closely examine the reactions to drug delivery following microneedle injection. Minimal scar and callus formation were observed, suggesting minimal injection-induced wounding to the plant. The proof of concept provided in this study opens the door to plant microneedles' application in plant biology and agriculture, enabling new means to regulate plant physiology and study metabolisms via efficient and effective delivery of payloads.

The study optimized the design of microneedles to target the systemic transport system in Arabidopsis (mouse-ear cress), the chosen model plant. Gibberellic acid (GA3), a widely used plant growth regulator in agriculture, was selected for the delivery. The researchers found that delivering GA3 through microneedles was more effective in promoting growth than traditional methods (such as foliar spray). They then confirmed the effectiveness using genetic methods and demonstrated that the technique is applicable to various plant species, including vegetables, cereals, soybeans, and rice.

Professor Benedetto Marelli, co-corresponding author of the paper, principal investigator at DiSTAP, and associate professor of civil and environmental engineering at MIT, shares, "The technique saves resources as compared to current methods of agrochemical delivery, which suffer from wastage. During the application, the microneedles break through the tissue barriers and release compounds directly inside the plants, avoiding agrochemical losses. The technique also allows for precise control of the amounts of the agrochemical used, ensuring high-tech precision agriculture and crop growth to optimize yield."

"The first-of-its-kind technique is revolutionary for the agriculture industry. It also minimizes resource wastage and environmental contamination. In the future, with automated microneedle application as a possibility, the technique may be used in high-tech outdoor and indoor farms for precise agrochemical delivery and disease management," adds Yunteng Cao, the first author of the paper and postdoc at MIT.

"This work also highlights the importance of using genetic tools to study plant responses to biomaterials. Analyzing these responses at the genetic level offers a

comprehensive understanding of these responses, thereby serving as a guide for the development of future biomaterials that can be used across the agri-food industry," says Sally Koh, the co-first author of this work and PhD candidate from NUS and TLL.

The future seems promising as Professor Daisuke Urano, co-corresponding author of the paper, TLL principal investigator, and NUS adjunct assistant professor elaborates, "Our research has validated the use of silk-based microneedles for agrochemical application, and we look forward to further developing the technique and microneedle design into a scalable model for manufacturing and commercialization. At the same time, we are also actively investigating potential applications that could have a significant impact on society."

The study of drug delivery in plants using silk microneedles expanded upon previous research supervised by Marelli. The original idea was conceived by SMART and MIT: Marelli, Cao, and Professor Nam-Hai Chua, co-lead principal investigator at DiSTAP. Researchers from TLL and the National University of Singapore, Professor Urano Daisuke and Koh, joined the study to contribute biological perspectives. The research is carried out by SMART and supported by the National Research Foundation Singapore (NRF) under its Campus for Research Excellence And Technological Enterprise (CREATE) program.

SMART was established by MIT and NRF in 2007. SMART is the first entity in CREATE, developed by NRF. SMART serves as an intellectual and innovation hub for research interactions between MIT and Singapore, undertaking cutting-edge research in areas of interest to both parties. SMART currently comprises an Innovation Center and interdisciplinary research groups: Antimicrobial Resistance, Critical Analytics for Manufacturing Personalized-Medicine, DiSTAP, Future Urban Mobility, and Low Energy Electronic Systems.

How some beetles ‘drink’ water using their butts

APRIL 4, 2023 WWW.SCIENCENEWS.ORG

Some beetles “drink” using their butts, and scientists are starting to understand how.

Red flour beetles, a major agricultural pest, open their anus to get water vapor in the air flowing into the lower gut and condensing on any poop there. The insects draw water out of the fecal material using special cells lining their lower digestive system, researchers report March 21 in Proceedings of the National Academy of Sciences.

This “amazing mechanism” could one day be exploited to make beetle-specific pesticides that could protect crops while safeguarding bees and other insects, says Kenneth Halberg, a comparative endocrinologist and physiologist at the University of Copenhagen.

Top of Form

The best of Science News - direct

Bottom of Form

Insect pests get into as much as 20 percent of the global food supply every year, destroying food and costing farmers money, the United Nations’ Food and Agriculture Organization estimates. Beetles are particularly pernicious. These insects can thrive in arid environments, including in supplies of wheat and other bone-dry crops. One way dry-adapted beetles survive is by recycling water out of their poop using the rectal complex, an organ near the end of their digestive system. But researchers didn’t know how the insects accomplished the feat.

Halberg and colleagues found that in red flour beetles (Tribolium castaneum), the gene Nha1 is more active in cells pockmarking the lining of the rectal complex than

elsewhere in the body. Scientists have previously suggested that the rectal complex's blisterlike cells were involved in sucking water out of material in the organ.

But "the paradox was that they don't look like transporting cells," says Michael O'Donnell, an insect physiologist at McMaster University in Hamilton, Canada, who was not involved with the research.

The new study may resolve that paradox. Nha1 produces a protein that pumps charged potassium particles across the cells' membranes, Halberg's team found. That may result in a buildup of the ions on the outside of the rectal complex, the researchers suspect.

Through osmosis, water will move toward areas with a high concentration of ions. So that pool of potassium could allow beetles to move water through the wall of the rectal complex and into the rest of the body.

Experiments confirmed that the insects opened their anuses in high humidity so water vapor could flow into the rectal complex. What's more, beetles with Nha1 deactivated didn't survive as well in dry conditions as normal beetles.

It's not clear whether other beetles use a similar mechanism, Halberg says. But the finding emphasizes how "nature has its way of developing some quite interesting solutions to some very interesting problems."

Chinese researchers find new mechanism to improve quality of cotton fibre

MON 10-04-2023 HTTP://WAM.AE/EN

Chinese researchers recently discovered a plant hormone which can regulate cotton fibre growth and is expected to improve the quality of cotton fibre, Xinhua News Agency reported today.

Cotton is an important cash crop in China and the main raw material used by the textile industry, which means that cotton fibre's quality determines the quality of textiles.

Brassinosteroid (BR), a growth-promoting phytohormone, regulates many plant growth processes, including cell development. However, the mechanism by which BR regulates fibre growth was poorly understood.

Researchers from the Institute of Cotton Research under the Chinese Academy of Agricultural Sciences discovered that BR can promote the molecular mechanism of cotton fibre elongation by modulating very-long-chain fatty acid biosynthesis.

Several key genes that regulate important characteristics of cotton can all be used as technical reserves to guide cotton production in the future, said Li Fuguang, leader of the research team.

"Next, we will continue to study whether BR plays a role in other ways, hoping to realise the transformation of sci-tech achievements to boost agricultural production," he said.

The researchers published their study results in three journals namely Plant Cell, Plant Physiology and Plant Biotechnology Journal.

Soil nutrients affect how attractive plants are to bees from the ground up

APRIL 4, 2023 WWW.PSU.EDU

Pollination is vital for many plants, and nutrients present in the soil before these plants even sprout may affect how attractive they eventually are to pollinators, according to Penn State-led research.

In a study with cucumber plants, the researchers found that in general, higher amounts of nitrogen and phosphorus in the soil resulted in larger plants and floral display, including flower number and size, leading to increased attractiveness to pollinators and increased fruit production.

However, they also found that regardless of nitrogen and phosphorus levels, pollinator "rewards" such as sugar content in nectar, the amount of nectar in female flowers, and protein and lipid concentrations in pollen stayed the same.

Anthony Vaudo, a USDA Forest Service research biological scientist who led the research while a postdoctoral scholar in entomology in Penn State's College of Agricultural Sciences, said these findings — recently published in Scientific Reports — suggest that plants may prioritize these rewards in all conditions to ensure that they attract pollinators.

"We found that a plant could become more attractive with the help of certain nutrients in the soil, while also keeping the quality of its rewards consistent, which is necessary for getting bees to visit," Vaudo said. "This gives us clues for how we can best restore soil, for example, after disturbance from human activity or natural disasters."

According to the researchers, previous studies have found an association between higher nitrogen and phosphorus in the soil and faster plant growth, as well as

positive effects such as number and size of flowers and pollen number and size. However, little work had been done on how these nutrients affect pollinator attraction and, ultimately, plant reproduction.

Christina Grozinger, Publius Vergilius Maro Professor of Entomology at Penn State, said that because soil nutrient conditions can change as a result of land use, climate change and land management — such as fertilizers and grazing livestock — it is vital to learn more about how these nutrients affect plant growth.

"With three quarters of our food crops using pollinators to set fruit and seed, and more than 80% of flowering plants benefiting from pollinators," Grozinger said, "it is incredibly important that we begin to understand and predict how these changes in soil conditions influence plant-pollinator interactions both in crops and in natural landscapes."

For the study, the researchers raised cucumber plants in Penn State greenhouses. They treated the plants with one of five fertilizer solutions: a control that had no added nitrogen or phosphorus and four others with different nitrogen and phosphorus concentrations and ratios.

The researchers measured several characteristics of the plants, including height and above-ground biomass, the size of each plant's male and female flowers, how many flowers each plant produced, how long it took the plants to start producing flowers after seeding, and how many cucumbers each plant produced. They also analyzed the flowers' nectar and pollen, as well as how often the flowers were visited by bumblebees.

After analyzing the data, the researchers found that while more nitrogen and phosphorus generally was associated with increased growth, attractiveness to pollinators and fruit production, very high levels of nitrogen began to have negative effects on some of these traits. However, increasing phosphorus levels could then mitigate this.

Overall, they found that the ideal ratio of nitrogen to phosphorus that they tested was 4:1, which resulted in best overall growth, pollinator attraction and reproduction.

Junpeng Mu, a researcher at Mianyang Normal University who visited Penn State while working on this project, said he thought it was particularly interesting that certain traits of the male flowers — such as number and size of flowers per plant, nectar concentration and pollen number per flower — varied with soil nutrients, but traits of the female flowers did not.

“These findings give us a better understanding of the mechanisms that underlie interactions between plants and pollinators,” Mu said, “as well as agricultural ecosystem operations.”

Additionally, Vaudo said he expects the findings will also be useful in his current position, in which he’ll be part of an effort to rehabilitate areas of forests that have been logged. He said the soil is often very compact from the heavy machinery that has rolled through these areas, as well as lacking in nutrients.

“After loosening the soil, we’ll apply a material called biochar to increase the soil’s ability to hold water and bind nutrients,” Vaudo said. “Then, we can start reintroducing plants and pollinators to the area. I’m thankful to have the experience from this study, which gave me a good starting ground for actually doing some real-life applications.”

The China Scholarship Council, Wyman’s of Maine and the U.S. Department of Agriculture’s National Institute of Food and Agriculture helped support this research.

Harland Patch, assistant research professor in entomology at Penn State, and Emily Erickson, University of California, Davis, also participated in this work.

BIODIVERSITY

Entrepreneurship and skill development on vanilla orchid cultivation held at Margherita Buddha Vihar

APR 22, 2023 WWW.NEINDIABROADCAST.COM

On the occasion of World Earth Day an Entrepreneurship on skill development and Vanilla cultivation held at Margherita Buddha Vihar premises which was organised by Margherita Buddha Vihar Dhamma Sangini trust in association with EDEN(Education for Environment) Tinsukia.

Rajarshi Das secretary of EDEN, Education for Environment, Tinsukia, Moumita Saha PGT Commerce Budding Buds Senior Secondary School, Tinsukia, Dr Nandita Roy Assistant Professor department of Mathematics Tinsukia College and Gyanowada Bhikkhu head monk of Margherita Buddha Vihar were the main persons for whom this great concept was able held on the occasion of World Earth Day.

Rajarshi Das said that Assam is rich in it's biodiversity where every flora can be easily cultivated and through vanilla orchid plantation one can earn huge amount of money if it is done in a proper way.

Spice Board of India ministry of commerce and Industry Government of India has given importance for vanilla cultivation as Kerala, Karnataka and Tamil Nadu have vast production of vanilla started since 90's which we are unaware of vanilla orchid cultivation but we have fertile soil for cultivation where in the market vanilla orchid cost Rs 40,000 to Rs 50,000 per kg said Rajarshi Das.

Rajarshi Das said that through vanilla orchid plantation unemployment can be eradicate from our society and nation and Spice Board of India shall cooperate to one who do vanilla orchid cultivation.

On this occasion more than 100 people from all round the Margherita region participated such as Asom Gaurav awardee Bobby Hazarika, AASAA central committee vice president Ramanus Lakra, Children Friends Club(NGO) president Papu Sah, Sanjeevani North East(NGO) Margherita Ramesh Hatimuria,Rana Dutta and Kishore Mech, Community resource person(NULM) of Margherita Bondita Chetia Borah, various cultivators from Tinsukia district, media persons of Margherita and many other organisation leaders were present.

Gyanowada Bhikkhu head monk of Margherita Buddha Vihar said that it is the first time that Entrepreneurship and skill development on vanilla cultivation held at Margherita which I hope that Assam Government and Spice Board of India shall take positive initiative for vanilla orchid cultivation at Assam.

Nagaland lies in 10th distinct bio-geographic zone in the world

2ND APRIL 2023 WWW.MORUNGEXPRESS.COM

Nagaland lies in the 10th distinct bio-geographic zone under one of the identified 18 Mega hot spot in the world with reference to threats to biodiversity. This was stated in the Annual Administrative Report 2022-23 of the department of Environment, Forest and Climate Change, tabled in the just concluded first session of 14th Nagaland Legislative Assembly in Kohima.

“It has the finest Tropical, Subtropical Evergreen forests and a unique Broad leaved Moist Temperate Forest,” the Report stated adding that the floral vegetation and fauna elements represent the transition zone of Indian, Indo Malayan and Indo

Chinese bio-geographic region. Many ancient angiosperms & primitive flowering plants are present and the area is considered as a cradle of flowering plants, the report stated.

It is also the Centre of origin of some rice variety and secondary origin of citrus, chilly and maize etc, it added.

Endangered species of the state

The Report highlighted the endangered species of the state and measures taken by the government to protect them and prevent extinction The Report stated that the local population being are intricately involved with the forests for their sustenance, be it agriculture, timber, small, timber, day to day use items or medicinal plants etc. "These forest products are also their main source of economy. Therefore, when the main stay of the people is dependent on forest, destruction of forests is imminent and thereby endangering many valuable species. Due to the primitive method/ practice of cultivation (i.e slash burning) the rich Biodiversity of the state is dwindling year by year. Most of species, both flora and fauna, appears to be endangered due to heavy biotic pressure/ interference and reckless deforestation," the report stated.

Flora

Dipterocarpous macrocarpous (Hollong), Shorea assamica (Makai), Rodhodendron Spp. Mesua ferra (Nahar), are rare and endangered spp.

Panax gensing (Gensing) is found only in Tuensang district at higher altitude. It is endangered. Aquilaria agallocha (Agar) is also a endangered species. Rare and endangered species of Orchids available in Nagaland are as follows -Thunia 1 spp, Arundinaria graminifolia (Bamboo orchid), Renenthera (Red vanda), Rhynchostylis (fox tail), Pleoni, Phauis (ground orchid) 2 spp, Paphiopedilum 1 spp, Cymbidium tigrinum 1 spp.

The report stated that the Govt. is taking various measures for propagation conservation and protection of these spp.

Fauna

The largest Asian mammal, Elephant is endangered spp. The other endangered spps are Melurses ursinus (Sloth Bear), Prionodon pardicolor (Spotted linsang, Tiger-civet), Panthera tigris (Tiger), Macaca assamensis (Tailed Pig). The Gaur, or Indian Bison in habitats in Intangki National Park and Fakim Wildlife Sanctuary and other hilly areas is facing extinction from Nagaland. The different Hornbills and Tortoise are also endangered, the report stated.

Community conservation in Nagaland

The Report stated that the conservation of common pool resources by local communities has a long history in Nagaland."Such conservation initiatives have been traditionally practiced in different forms with varied institutional structures," the report stated adding that several such practices are initiated by community organization like youth organization, women groups, religious/cultural groups and village councils with the community as a spontaneous reaction to address the problems of forest/environment degradation.

Nagaland has 407 documented Community Conserved Areas (CCAs) out of which 343 Nos of CCAs, which constitute 84.3% are self-initiated and 62 Nos of CCAs (15.2%) are being initiated by Forest Department.

Biodiversity targets may be slipping out of reach

19 APRIL, 2023 WWW.BBC.COM

Ambitious targets to halt the decline in nature may already be slipping out of reach, a study suggests.

Scientists say the effects of climate change and habitat loss on animal populations have been underestimated.

They say bringing back wildlife may take longer than expected and that unless we act now global biodiversity targets will be out of reach.

In December almost 200 countries agreed to halt the decline in nature by the end of the decade.

They set ambitious goals to halt the loss of biodiversity and protect 30% of lands and seas by 2030.

- What is biodiversity and how can we protect it?
- Can we set aside a third of our planet for nature?
- What is a mass extinction and are we causing one?

Clearing of forest and natural land is one of the biggest drivers of biodiversity loss

"What this analysis is highlighting is that it's even harder than we think [to meet the targets]" said Dr Robin Freeman of ZSL's Institute of Zoology in London.

"We need to act more urgently and more quickly, and tackle more things to achieve them."

The study, published in the Royal Society journal, Proceedings B, analysed trends in populations of more than 600 different species of birds and mammals.

The scientists found that past modelling work had largely ignored time lags of decades before the effects of drivers such as climate change and habitat loss kick in.

This means we may be further down the line towards biodiversity loss than we thought.

"We've seen delayed effects of up to 40 years for large mammals and birds," Dr Freeman told BBC News.

"And that means that the longer we wait to take action the longer it will take to see any kind of response."

Some bird populations, such as geese, are set to recover while others face a bleak future

On the plus side, the research suggests immediate action on such things as unsustainable hunting and over-exploitation of natural resources will have immediate and far-ranging benefits.

More plants and animals are going extinct than at any other point in human history. In December countries signed up to a landmark agreement setting global goals to address biodiversity loss.

A total of 188 governments including the UK committed to global targets for 2030, from reducing global food waste by half to phasing out subsidies that harm biodiversity.

CLIMATE CHANGE

How Climate Change Can Impact Indian Crops in the Long Term: Study Provides Insight

26 APR 2023 WWW.NEWS.ABPLIVE.COM

Both developed and developing countries have agricultural vulnerability, but there is a huge disparity between the susceptibilities of their agricultural yields to damage from climate change.

Climate change and subsequent extreme weather events such as floods and droughts have a significant impact on agriculture. India is a global agricultural powerhouse, the second largest producer of wheat and rice in the world. According to the World Bank, India has the world's largest herd of buffaloes, the largest area under wheat,

rice and cotton, and is the world's largest producer of wheat, milk and spices. Climate change has negatively affected India's crop yields, both in the long term and in the short term.

Both developed and developing countries have agricultural vulnerability, but there is a huge disparity between the susceptibilities of their agricultural yields to damage from climate change. A new study, led by Carl R Woese Institute for Genomic Biology, University of Illinois at Urbana-Champaign, provides new insights into how climate change can impact Indian crops in the long term. It also explores the short-term effects of climate change on the yields of major Indian crops.

The study describing the findings was recently published in the journal Agricultural Economics.

Shifts in weather patterns, such as a hot day with a sudden thunderstorm, are short term. However, long-term differences, such as prolonged periods of heat waves, are the hallmark of climate change. In a statement released by the University of Illinois at Urbana-Champaign, Madhu Khanna, a professor of agriculture, said most studies that measure the effects of climate change focus on year-to-year changes, which are representative of variations in weather and not climate, but the new study has used data across 60 years to examine how deviations in weather from long-term averages affect the yields of three major cereal crops: rice, maize and wheat.

Khanna explained that the researchers wanted to see if the short-term deviations in extreme temperature and precipitation are significant when compared to their long-term averages, and if their effects are absent in the long term because farmers are trying to adapt to climate change.

How the study was conducted

In order to determine if farmers were adapting to the long-term changes in climate change, the researchers used 60-year data sets on temperature, the length of the

growing season, precipitation, and crop yield to create different models for short-term and long-term responses of crops.

The study says that if differences in temperature have no impact in either the short-term model or the long-term model, there have been no adaptations. However, if the short-term impact is worse, it implies that the farmers have been able to adapt and smooth out the effects, the study states.

Indian farmers have been unable to adapt to climate change-induced variations in temperature for wheat

Khanna said the researchers found that the farmers were able to adapt to changes in temperature for rice and maize but not wheat, and that increased precipitation enhanced rice yield, but adversely impacted wheat and maize yields. The team also found that farmers are customising their strategies across different regions and crops. For instance, heat-prone districts fared better to higher temperatures compared to districts in colder regions, the study says.

Differences in ways of adaptation in accordance to productivity

According to the study, farmers who worked in areas that were less productive, and hence, were at the lower tail of distribution, faced more significant adverse effects compared to the farmers who worked in areas where the yields were higher, and hence, were at the upper tail of distribution. The former group of farmers took more adaptation measures due to higher impacts of climate change.

Surendra Kumar, one of the authors on the paper, said since higher productive regions have better irrigation facilities and are less dependent on the monsoon, the difference between long-term and short-term impacts in those areas is negligible.

Crops can adapt in two ways, the study says. The first way is for farmers to change their management practices, and the second way is to change the varieties of crops grown. The study states that action can be taken to improve seed varieties and educate farmers on how they can adapt to changing climate.

Khanna said that the study is a part of the researchers' overall effort to build understanding across different countries. She explained that it is interesting that the

results of the study are telling the researchers that in both the United States, where the team conducted a similar study in the past, and India, the crops are adapting, despite the negative impact of climate change.

However, Khanna said, the effects of climate change differ across crops, and the types of effects crops are adapting to also differ from each other. Therefore, a holistic view of all the various ways in which changing climate affects yield is needed, and it is important to understand that focusing on particular dimensions of climate change and adapting crops may not be sufficient.

Food security: Climate change is affecting the seeds that India depends on

05 APRIL 2023 WWW.DOWNTOEARTH.ORG.IN

When a group of 20 farmers in Andhra Pradesh's Alluri Sitharama Raju district ventured into production of seeds of finger millet (*ragi*) and little millet (*samai*) in 2019, it had no idea what the future had in store.

For the next two years, unusual weather events ensured that the crops did not have grains well enough for use as seeds.

"The years 2020 and 2021 saw excess rain in July and August. This did not allow the plants to take nutrition from the soil. The resultant grains were weak and the endosperm—part of a seed that stores food for the development of a plant and is crucial for germination—was absent when the seeds were crushed open for inspection," says M L Sanyasi Rao, programme manager of Watershed Support Services and Activities Network, a non-profit working with tribal farmers in the area.

The farmers had estimated 20 tonnes of produce, but the harvest in November 2021 resulted in only 15 tonnes, with the grains unusable as seeds. The harvest was then sold as crop for Rs 25 per kg, while its sale as seed would have fetched R35 per kg. There is no difference in the cultivation mechanism for producing seeds or for growing crops. Vast majority of farmers in India set aside a part of their field for growing seeds that can be used the next season.

But climate change has posed a threat to seeds, which are essential for food security of the country. Grains of wheat and rice, the two staples distributed under the government's public distribution system and crucial to food security, have also seen a shrinkage in recent years, say farmers.

"Usually, the share of light or weak grains is 5-7 per cent. But last year, over 20 per cent of my wheat grains were of poor quality. These cannot be used as seeds," says Vikas Choudhary, a farmer from Karnal district in Haryana.

Choudhary works as a participatory farmer with the Indian Agricultural Research Institute (IARI) under Indian Council of Agricultural Research's (ICAR's) seed production programme.

Wheat, paddy hit

Most wheat varieties require a temperature of under 25°C during the day in February-March, when the plant is at the grain filling stage. A 1°C temperature rise above 25°C shortens the reproductive phase by 6 per cent and the grain-filling duration by 5 per cent, reducing the yield, says *Climate Change and Global Crop Productivity*, a book published in 2000.

Data with India Meteorological Department shows that the 25°C limit often gets breached. March 2022 had several days with temperature crossing 30°C, reducing wheat yields in the north and central Indian states.

The country produced 106.84 million tonnes of wheat in the 2021-22 crop season, which is less than 109.59 million tonnes produced in 2021, as per data with the Union Ministry of Agriculture and Farmers' Welfare.

Similar was the case with paddy. In August 2022, Punjab, Haryana and Uttarakhand witnessed spread of dwarf virus in paddy.

Experts say that high temperature in May and June was among the likely reasons for the spread of the disease, which causes stunting of the plant.

Drought during the early development of the seeds also reduces their quality at maturity. Paddy is also adversely affected due to excess rains.

Harbhagwan Ghai, a Karnal-based farmer involved in seed production for past 15 years, says that in the last few years, the paddy plant is getting impacted at the flowering stage in September-October due to continuous and heavy rainfall.

"The shine of the grain gets reduced if excess rainfall happens at the flowering stage. It also affects pollination. No pollen means no seeds," he says.

Apart from an increase in temperature and rain events, another worry for farmers has been high speed winds.

"These usually blow across north India in March, but this year February saw high winds. This is the time when the wheat crop is flowering and pollination is happening. If farmers have just watered the fields and winds occur, the plant gets unsettled by the root," says Virender Kumar from Seedhepur village in Karnal.

Heat, rain impact

Rise in temperature damages crops in multiple ways. It hastens crop development, shortening the seed filling duration. It speeds reproductive development and pollen formation, leading to development of smaller seeds.

Heat stress can also trigger early or delayed flowering. A high temperature stress before seeds reach physiological maturity can reduce germination by inhibiting the ability of the plant to supply the assimilates necessary to synthesise the storage compounds required for the germination process, and/or the seeds suffer physiological damage to the extent that the ability to germinate is lost.

A 2016 paper in *Agriculture* also mentions how elevated carbon dioxide (CO_2) and temperature alter the sexual reproductive phase in plants, and hamper genetic quality in seeds.

"Elevated CO2 and temperature can induce changes in the sexuality in crops plants, including a breakdown in self-incompatibility or male sterility mechanisms. Breakdown of these genetic mechanisms results in self-pollination. As a consequence, the genetic integrity of the cultivar is lost and any seed produced will no longer be true-to-type," it says.

Research has found global evidence on the link between high temperature and yield across crops, such as maize and soybeans.

Resistant varieties

Agricultural scientists consider improved seeds and varieties adapted to regions with different agricultural climates an effective solution to the problem. This is the reason disease- and climate- resilient varieties have been developed in the last few decades.

Gaurav Tripathi, senior research analyst at non-profit International Food Policy Research Institute, New Delhi, says ICAR has been releasing varieties that can fight heat, disease and extreme weather since 2005.

For example, central and state governments have notified 448 wheat varieties for cultivation between 1965 and 2018, as per "Wheat varieties notified in India since 1965" published by ICAR's Indian Institute of Wheat and Barley Research in 2018. Of these, about 150 varieties have been released after 2005. "But efforts to popularise new varieties have not borne result because the agriculture department has not been able to convince farmers to grow them," says Tripathi.

ICAR's "Vision 2025" document released in 2007 says that the "percentage of share of IARI varieties in total breeder seed production in the country varies from 20.4% to 32.9% in wheat".

Rest of the seeds used are either developed by farmers themselves or by private companies. Ramesh Singh, head of wheat programme at Banaras Hindu University, Uttar Pradesh, says that seed replacement ratio (share of new seeds used every year) of wheat in India is only up to 20 per cent, which shows that farmers continue to grow old varieties.

In February 2023, IARI registered a new heatwave-resistant wheat variety, HD3385, which is being tested at multiple locations in the current rabi season.

The variety is sown early and harvested by March-end, before extreme heat sets in.

In public-private-partnership mode, the variety is being sold by Biosey, a DCM Shriram Ltd company, with the government getting a royalty on every kilogramme of seed sold.

This is the first time a seed developed by government is being sold by a private company. “The initiative is aimed at ensuring the variety reaches a large number of farmers,” says an agriculture department official requesting anonymity.

“No matter how many varieties we create, none can withstand 40°C,” Rajbir Yadav, principal scientist and weed breeder, ICAR, New Delhi, tells *Down To Earth*.

“Though I grow my own seeds, and develop new wheat and paddy varieties, I had to go to Uttarakhand last year to buy 100 tonnes of seeds from a private company, after I lost 40 per cent of my produce due to heat,” says Chandrashekhar, Singh a farmer and Padmashree awardee based in Varanasi, Uttar Pradesh.

The UN Intergovernmental Panel on Climate Change’s Synthesis Report, released on March 20, says that the rate of rise in agricultural productivity has declined over the past 50 years due to climate change, with “related negative impacts mainly in mid- and low-latitude regions”.

Since this region includes vast parts of India, the country must ensure that its agricultural productivity, which depends on seeds, remains intact.

Faced with growing climate threats, farmers in India are gearing up for adaptation

APR 11, 2023 HTTPS://SCROLL.IN/

A study notes that farmers are recognising changes in weather patterns and independently adapting to its impact on agriculture.

In late February, the Indian Institute of Wheat and Barley Research, a leading scientific institute for wheat, released an advisory recommending farmers in India to spray potassium chloride on wheat crops in case of a sudden rise in temperature. This was to avoid heat-induced damage caused by temperatures increasing by as much as 10 degrees Celsius above normal in some wheat-growing areas of the country. A month later, in the second half of March, the institute again released an advisory, but this time it suggested that as light to heavy rains are expected, farmers should keep tabs on the India Meteorological Department's weather updates and prevent water logging of the fields. It also advised farmers not to spray chemicals in these climatic conditions.

These advisories, that came close together but with differing recommendations, reflect the weather uncertainties that farmers face and must adapt.

Last year, weather uncertainties and extreme weather events saw losses in the agricultural sector. The government, which earned $2121.5 million in 2021-'22 from exporting wheat, banned export in May 2022 after the heatwave affected production. That restriction continues. With the expected effect of El Nino, which may cause drought-like situations, India, one of top wheat producing countries, may now need to import wheat.

While talking to Mongabay-India, former Union Agriculture Secretary Siraj Hussain said, "The extent of loss to wheat crops due to untimely rains in March is yet unknown, but I think the production would still be about 105 million tonnes or more. Since wheat export is banned, India's wheat balance sheet will not be in

trouble. However, climate change is a reality, and our research institutes should be sufficiently funded to breed drought-tolerant crops."

Highlighting weather uncertainties

Recognising climate change's increasing impact on agriculture, the Union Minister of Agriculture and Farmer Welfare Narendra Tomar, recently shared in the Parliament, that the effects of climate change on agriculture in India are expected to reduce wheat and rice production. "In the absence of adaptation measures, rainfed rice yields in India are projected to reduce by 20% in 2050 and 47% in 2080, while irrigated rice yields are projected to reduce by 3.5% in 2050 and 5% in 2080. Climate change is projected to reduce wheat yield by 19.3% in 2050 and 40% in 2080 towards the end of the century with significant spatial and temporal variations," he said, as part of an answer to a Lok Sabha question on March 21. Tomar added that climate change may reduce the kharif maize yields by 18% and 23% in 2050 and 2080, respectively.

Previously as well, the Union government has highlighted the increase in uncertainty in weather. Some five years ago, in the Economic Survey, the government dedicated one full chapter to climate change and its impact on agriculture.

Based on district-level data, the survey underlined the farm income losses of 15% to 18% on average, rising to 20%-25% for unirrigated areas. India needs to spread irrigation – and do so against a backdrop of rising water scarcity and depleting groundwater resources, the survey has recommended.

The survey has highlighted the importance of adaptation by saying, "In the absence of any adaptation by farmers and any changes in policy (such as irrigation), farm incomes will be lower by around 12% on an average in the coming years. Unirrigated areas will be the most severely affected, with potential losses of 18% of annual revenue."

Localized adaptation methods

While studies and reports emphasise the impact of climate change, farmers are independently observing changes in weather patterns and adapting to these changes, said a study that appeared in August 2022. Farmers have a perception of rise in temperature and erratic and decreased rainfall and their observations are consistent with the meteorological data, the study, by researchers from Indian Institutes of Technology-Kharagpur and Asian Development Bank Institute, concluded.

Analysing empirical studies conducted between 2000 and 2020, the researchers found that more than 57% of farmers perceive a change in precipitation (such as changes in timing and intensity of rain or snow) and 33% find there is a change in temperature (changes in average temperatures and periods of hot or cold seasons). Researchers studied 52 papers, including 35 from online searches and the rest from references.

Based on their observations of the change in the weather patterns, farmers are experimenting with adaptation methods themselves. The researchers have divided these measures into three categories – incremental, systematic and transformational. In their study, the researcher found 35 examples of incremental adaptation and 21 examples of each systematic and transformational adaptation. Farmers adopting incremental measures maintain the essence and integrity of current technology, organisation and administration by changing the elements here and there. It included changes in sowing and spacing, soil conservation measures, pest and insect management, and water and livestock management. In systematic measures farmers are using new or improved sowing techniques, shifting to climate-ready varieties, improving pest management, etc. Meanwhile, in transformational adaptation, farmers are shifting to a completely new crop system, changing the location of the agriculture field or changing the policy structure.

However, the study also highlighted the limitations of the research papers that it has based its analysis on, by saying, "The majority of the studies took 'farmers' perception too lightly." These studies just matched farmers' perceptions with instrumental records.

The reviewed literature does not clarify whether the adaptation actions were explicitly taken in response to the perceived changes in the meteorological variables. It is also unclear how successful these adaptation measures were.

Highlighting the need for more studies, lead author of the paper Pritha Datta said, "Even if we apply all the mitigation measures, the impact of climate change will be visible for several decades. In this case, the role of adaptation becomes important. We should combine local adaptation with national and global mitigation initiatives to deal with climate change impact. For adaptation, we need a targeted initiative like training so that it can become more meaningful." Pritha Datta is a principal investigator in Asian Development Bank Institute project.

Datta said, based on their analysis, it is unclear whether farmers are taking adaptative measures because of climate change and it might even be an effort to improve income.

Professor at Indian Institutes of Technology-Kharagpur, and second author of the paper, Bhagirath Behara said it is clear now that climate change is happening and showing its impact on the ground. Mitigation requires a global effort, but adaptation can be done locally. Farmers are trying to cope with the changing weather pattern on their own. Their adaptation strategies vary from region to region. It shows that there is no one silver bullet. So, engaging with the community is necessary to understand what works better.

He said that the paper highlights the readiness of farmers and a push from policymakers can shape the ongoing adaptation process. Another highlight of the

paper is that the knowledge is available at the ground level, and policymakers can use this knowledge to shape the adaptation process.

There are a few other highlights, like a segment of farmers using more fertilisers and pesticides to ensure good production. That is not healthy, noted Behara. If the government runs an awareness campaign or publishes manuals, it will help these farmers to stick to the best practices. Small farmers aware of the good adaptation strategies cannot adopt them because of a lack of credit. These are the areas the government can focus on, Behara said.

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Innovative method predicts the effects of climate change on cold-blooded animals

APRIL 3, 2023 WWW.PSU.EDU

In the face of a warming climate that is having a profound effect on global biodiversity and will change the distribution and abundance of many animals, a Penn State-led research team has developed a statistical model that improves estimates of habitat suitability and extinction probability for cold-blooded animals as temperatures climb.

Cold-blooded animals — a diverse group including fish, reptiles, amphibians and insects — comprise most species on Earth. The body temperature of cold-blooded animals is strongly influenced by the temperature of their environment. Because their growth, reproductive success and survival is tightly coupled to environmental temperatures, climate change represents a significant threat to them.

Understanding the future effects of climate change on biodiversity is a global priority, according to research team leader Tyler Wagner, a scientist with the U.S. Geological Survey and a Penn State adjunct professor of fisheries ecology. But predicting where a species will exist and in what abundance under future temperatures is extremely challenging, he noted, because for many species this means estimating responses to temperatures that the animals have not yet experienced, and scientists have not yet observed.

To more precisely estimate the effects of climate change on cold-blooded animals, in a new study, the researchers developed a statistical method to fuse data collected in the field describing the distribution and abundance of many cold-blooded animals with laboratory-derived information about species-specific temperature performance and tolerance.

In findings published today (April 3) in the Proceedings of the National Academy of Sciences, Wagner and colleagues report the development of an innovative statistical modeling approach. Their newly developed model, which they call the "Physiologically Guided Abundance Model," or PGA Model, can be applied across almost all cold-blooded animals, and is believed to have great potential to help inform the formation of climate adaptation and management strategies.

"The challenge was how to combine these two sources of information and use laboratory-derived information to help inform landscape-scale predictions under future climates not experienced by animals in their current ranges," said Wagner, who is assistant unit leader of the Pennsylvania Cooperative Fish and Wildlife Research Unit in the College of Agricultural Sciences. "The model we created accomplishes that."

The PGA model combines observations of species abundance and environmental conditions with laboratory-derived data on the physiological response of cold-

blooded animals to temperature to predict species geographical distributions and abundance in response to a warming world. Without including species' physiological preferences in a model, Wagner suggests, it is difficult to realistically forecast cold-blooded animals' fate.

"When trying to predict, or extrapolate, the effects of climate change on animal distribution and abundance, scientists now often only use information that describes

the relationships between abundance and distributions and temperature under current conditions," he said. "These relationships are then used to extrapolate under future temperature conditions."However, this approach assumes that species-environment relationships are biologically meaningful under future temperatures and, importantly, fails to account for the tight link between environmental temperatures and cold-blooded animal physiology, Wagner explained.

"Although cold-blooded animals are understudied when it comes to understanding how their distributions and abundance will respond to climate change, these animals are relatively well-studied when it comes to laboratory-derived information about how changes in environmental temperatures affect physiology and performance," he said. "In fact, most cold-blooded animals share a similar functional response in relative performance with increasing temperatures, which can be generalized across a diversity of taxa."

The researchers developed their PGA model using data from three fish species that differ in their thermal preference and tolerance across more than 1,300 lakes located in the U.S. Midwest. They compared the PGA model's results to those from a traditional model that does not incorporate species' physiological responses. Fishes considered in the research were cisco (coldwater), yellow perch (coolwater) and bluegill (warmwater).

The researchers predicted species distributions and abundance at each lake under current conditions and for 1.8-, 3.6-, 5.4- and 7.2-degree (Fahrenheit) increases in mean July water temperatures. A 7.2-degree F increase corresponds to the predicted average regional increase in air temperature across the Midwest region for the 2071–2100 time period.While the results of the traditional model did not predict that any of the fish species would be extirpated, or locally driven out, by climate change, the PGA model revealed that cold-adapted fish would be extirpated in 61% of their current habitat with rising temperature.

Gretchen Hansen, assistant professor at the University of Minnesota and a coauthor on the study, suggested that models that do not include physiological preferences may lead to underestimations of the risk climate change may pose to cold-adapted species.

“We showed that temperature-driven changes in distribution, local extinction, and abundance of cold-, cool- and warm-adapted species varied substantially when physiological information was incorporated into the model,” she said. “The PGA model provided more realistic predictions under future climate scenarios compared with traditional approaches and has great potential for more realistically estimating the effects of climate change on cold blooded species.”

Also contributing to the research at Penn State was Christopher Custer, doctoral degree student in the Department of Ecosystem Science and Management; as well as Erin Schliep, Department of Statistics, North Carolina State University; Joshua North, Climate and Ecosystem Sciences Division, Lawrence Berkeley National Laboratory; and Holly Kundel and Jenna Ruzich, Department of Fisheries, Wildlife, and Conservation Biology, University of Minnesota.

This research was funded by the U.S. Geological Survey Midwest Climate Adaptation Science Center and the National Science Foundation.

ORGANIC FARMING

Bountiful harvest: Kanjikuzhi panchayat's organic farmers move into festive mood

13TH APRIL 2023 WWW.NEWINDIANEXPRESS.COM

ALAPPUZHA: The cultivation of pesticide-free vegetables has for long been a social and political hot potato in the district. In association with agriculture and horticulture departments, many panchayats have been producing organic vegetables on a large scale, particularly in the run-in to the festival season. For the past many years, Kanjikuzhi panchayat has set the model for organic vegetable cultivation. This year, too, its farmers have produced large quantities of bio-vegetables for the Vishu season. Over 100 acres of farms cultivated by 50 farmers are ready for harvest. Many farmers have already started harvesting and their produce have reached markets.

During the festival season, an average of 6,000kg of vegetables reach the market every day. Farmers here solely rely on bio-farming methods. And the sandy nature of the land ensures a good output, officials said.

According to panchayat vice-president M Santhosh Kumar, more than 100 acres are ready for harvest this week. Kani vellari (yellow cucumber), kani mathan (yellow pumpkin), snake gourd, bitter gourd, ridge gourd, okra and snake bean are cultivated here. We expect a revenue of around Rs 50 lakh from the current season, he said.

Farmers' outfits and the agricultural department have opened outlets to sell bio-vegetables along the national highway near SN College Cherthala, Kanichukulangara and Thiruvizha. Most farmers sell their produce directly to wholesalers at the farm itself.

A full-time farmer since 2007, Subhakesan first adopted organic farming more than 18 years ago. On average, vegetables worth Rs 45,000 can be harvested from a one-acre farm every month. The outlets under the Panchayat Development Society help farmers sell their produce. The society collects vegetables directly from the farms, thereby saving farmers the need to find suitable markets, he added.

K K Kumaran Palliative Care Society, a charity organisation, took up farming on around one acre of land owned by state-owned SILK at Kanjikuzhi. Subhakesan leads the activities here, where kani vellari and kani mathan are chiefly grown. Cow dung, ash, neem waste, and fish oil are used as manure. Bio-pesticides like tobacco solution and traps are used to destroy pests. There is no constraint on farming using bio-methods, says Subhakesan.

The panchayat is providing all support to farmers, said Santhosh. "The excessive use of chemical pesticides has created many health and ecological problems. So we decided to support bio-farming. The panchayat has opened sales outlets in various places and many traders buy the consignment from these outlets directly. Our products come at a slight premium in terms of pricing, but it is not a problem for consumers who accord more importance to quality," he said.

Maharashtra: 15 Clusters of Farmers to Carry Out Organic Farming on 300 Hectares in Latur

09 APR 2023 HTTPS://WWW.OUTLOOKINDIA.COM/

A firm in Maharashtra's Latur district will carry out organic farming on 300 hectares of land under the aegis of the state agriculture department, an official said. Fifteen clusters of farmers have been formed for this initiative, each of which will get Rs 10 lakh over the next three years to cultivate crops in Chakur tehsil here without using chemicals, he said.

"Chemical fertilisers, pesticides and herbicides are being used in very large quantities for cultivation. To stop harmful effects from such produce, the state agriculture department is promoting organic farming under the Conventional Agriculture Development Scheme (CADS)," the official said.

"The Nalegaon-based company will coordinate to implement organic farming on 300 hectares in the district under the Agricultural Technology Management System. The Rs 10 lakh that will be given to each farmers' cluster will include aid to obtain Participatory Guarantee System (PGS) certification," he said.

PGS is a quality assurance initiative under the National Project of Organic Farming (NPOF) of the Union Ministry of Agriculture and Farmers Welfare. The official said these farmers' clusters will also get aid for soil testing, green manure, setting up compose depots and purchasing natural fertilisers.

Each cluster consists of 20 farmers from Nalegaon, Ajansonda (Khurd), Sawantwadi, Hatkarwadi, Ukachiwadi, Hudgewadi, Limbalwadi, Sugaon and Gharni villages, he said. "The aim is to provide chemical free produce to

consumers," said Dattatray Gavasane, project director of the Agricultural Technology Management System.

Bihar plans incentives to boost organic farming in big way

APR 04, 2023 WWW.HINDUSTANTIMES.COM

Currently, chemical-free farming is being done in 13 districts along the river Ganga, which would be extended to other areas this year under the 4th agricultural road map in a big way, said agriculture minister Kumar Sarvajeet.

Encouraged by farmers' response to organic farming in areas covered by a pilot project, Bihar's agriculture department has decided to launch special incentive programme to popularise the natural way of farming in all 38 districts, said a senior officer of the state agriculture department.

Currently, chemical-free farming is being done in 13 districts along the river Ganga, which would be extended to other areas this year under the 4th agricultural road map in a big way, said agriculture minister Kumar Sarvajeet, adding that the new agricultural road map would be unveiled shortly.

Officials said the department has proposed offering incentive on setting up the vermicompost making units, biogas plants, biotech laboratories on private-public-partnership mode in all districts, promoting innovation and start-ups in organic farming sector and financial support to cluster of farmers engaged in production of green manure. "The incentive scheme envisages extending subsidy up to 90% of the cost in certain areas," said an official.

Around 40,000 farmers have been engaged in organic farming in districts like Patna, Buxar, Bhojpur, Saran, Vaishali, Samastipur, Khagaria, Begusarai, Lakhisarai, Bhagalpur, Munger, Nalanda and Katihar for the past three years (since 2019-20).

All the farmers have received c-2 certification of their produce and very soon their products would be marketed with c-3 certification, the highest credentials for organic farming.

Currently, the farmers are being given financial assistance of ₹11,500 for per acre organic farming, besides free bio fertilizer and certified seeds from the state government. “Organic farming is being done on around 37,000 acres by more than 200 clusters of farmers. The department has decided to provide financial support of ₹5000 or 50% of the cost of development each vermicompost units. The department hopes to facilitate building of around 19,000 vermicompost units this year,” said the official.

Apart from this, the state government has also approved the department’s plan of supporting private entrepreneurs in setting up at least 13 commercial vermicomposting plants for which they would be given subsidy of ₹6.40 lakh or 40% cost of the each unit.

Meet Satya Prabin software engineer quits Malaysian IT job to pursue organic farming, earns in lakhs

APR 22, 2023 WWW.DNAINDIA.COM

Satya Prabin, a software engineer turned farmer in Odisha's Rayagada district, left his high-paying IT job in Malaysia to return to his village and fulfill his passion for farming. His father used to cultivate vegetables for a living, and Satya was inspired to pursue farming. He began farming on his 34-acre land using modern techniques such as the drip system and organic

fertilizers. Satya's success in agriculture has made him a role model for other farmers in the community.

After completing his B.Tech in software engineering, Satya spent 11 years working for a Malaysian IT company, earning Rs 2 lakh per month. However, he always had a passion for farming, which was instilled in him from his childhood observations of his father working in the fields. In 2020, Satya returned to his village and began farming, using modern techniques and organic fertilizers to grow a variety of vegetables.

Satya's approach to farming is unique and innovative, which has earned him the admiration of the locals and the attention of the authorities. He employs around 60 people in his village and neighboring villages, making him a significant contributor to the local economy. Collector Swadha Dev Singh visited Satya's farmland and was full of praise for his work.

Satya's success as a farmer has made him a role model for others in the community. According to Laxmi Narayan Sabat, the Rayagada block development officer, small-scale farmers need to follow Satya's example and grow vegetables on their land using organic fertilizers to become self-sufficient and improve their financial situation. Additionally, vegetables grown organically are better for health.

Satya's journey from a software engineer to a successful farmer is a story of determination, perseverance, and passion for agriculture. He has shown that success is achievable if one follows their heart and works hard towards their goal.

Indian government approves trials of GM Disease Resistant Potatoes & Fortified Bananas

APRIL 02, 2023 WWW.POTATOPRO.COM

For the last few months, the Genetic Engineering Appraisal Committee (GEAC), the federal government agency that monitors and approves GM activity, has approved field trials of many GM crops, including rubber and newer cotton varieties. This follows nearly two decades of modest progress in the field since the approval of GM cotton in 2002.Sanjeev Sharma, Principal Scientist at the Indian Council of Agricultural Research (ICAR)-Central Potato Research Institute (CPRI) : "It is understandable to be concerned about the crop's safety. Because we have free speech, campaigners have the right to share their concerns. However, it is the responsibility of a scientist to produce facts and data to demonstrate that the crop is safe to ingest."

Sharma has been working on developing a potato variety that can tolerate the fungal disease late blight since 2005. The pathogen Phytophthora infestans causes late blight. It can also harm tomatoes and other members of the Solanaceae family, which includes peppers & brinjals. In cool, wet weather, the disease spreads quickly and can cause substantial damage to potato crops.Late blight is a big worry for potato growers in India, where the potato is one of the most important crops. According to an ICAR assessment, late blight can result in yield losses of up to 50%.

The illness can also make potatoes unfit for human consumption or processing,

resulting in additional economic losses. According to ICAR data, the average annual loss due to late blight in India is estimated to be 15% of overall crop. The disease is widespread across the country, but losses are higher in hilly areas, where the crop is produced under rainfed circumstances, than in plains. Sanjeev Sharma:"After wheat and rice, potatoes are the world's third most significant food crop. The crop is produced on 2.2 million hectares in India, with an annual production of roughly 53 million metric tonnes. The productivity is approximately 23 to 24 tonnes per hectare."

He further stated that 90% of the crop is cultivated in the subtropical Indo-Gangetic area, where late blight comes in epidemic form after every third or fourth crop cycle. When late blight strikes, it can cost farmers Rs 70,000 crore per year, according to Sharma. Traditionally, pesticides and fungicides have been used to manage the disease, raising the expense of cultivation. Furthermore, when the pathogen is repeatedly exposed to fungicides, it develops resistance to them. Sanjeev Sharma:"During the course of eight to ten years, diseases acquire resistant to even new varieties of blight-resistant crops generated through inbreeding."

To go around this, the researchers created a novel potato variety that expresses a gene known as the RB gene. This gene, derived from the wild potato species Solanum bulbocastanum, makes the plant resistant to late blight. Under a material transfer agreement with scientists in the United States, the team began by importing GM potatoes. Sanjeev Sharma:"That variety was cross-bred with the most popular Indian variety, Kukri Jyoti, which accounts for more than 21% of the land in India."

KJ66, the new GM cultivar, will now go through Biosafety Research Level (BRL)-1 and BRL-2 studies. The BRL-1 trials are constrained experiments in which each trial location's seeding is limited to one acre of land.At this point, researchers may only sow the seeds in a total of 20 acres at a time. Each location in the BRL-2 experiments can use up to a hectare (2.47 acres) of land. Sanjeev Sharma:"We intend to carry out the trial in six different agri-ecological

zones, three in the highlands and three in the subtropical plains. We have acquired no-objection certificates from the governments of Meghalaya and Himachal Pradesh for the trials. We've also approached other states."

The scientists intend to sow the initial seeds for the trial in Shimla and Shillong during the Kharif season this year. Because trials in diverse ecological zones will help scientists better assess if the variety is suitable for the entire country or if it must be limited to specific places, the CPRI has also requested permission from Uttar Pradesh, Madhya Pradesh, and Punjab.

Siddharth Tiwari, a researcher at the National Agri-Food Biotechnology Institute (NABI)-Mohali, has been researching on increasing bananas' nutritional profile.

Siddharth Tiwari:"GM technology is the most effective technique to improve the qualities of bananas. We can only rely on biotechnology advancements to improve banana features."

The battle for Tiwari's team is not against a crop disease. Rather, they intend to combat anaemia and vitamin A deficiency with a widely available and inexpensive food source.According to Tiwari, vitamin A and iron supplements in pill form are not always feasible, and strengthening existing foods with these nutrients may be a better option. In 2012, NABI Mohali began working on the project.

To introduce pro-Vitamin A, the researchers took the NEN-DXS2 gene from Nendran, a typical banana variety in Kerala. The researchers turned to rice for OsNAS1 and OsNAS2 genes that express iron. Siddharth Tiwari:"We hope to start our trials within the next couple of months now that we have all the licences."

This year, event selection trials will be held in Tamil Nadu, Gujarat, Assam, and Punjab. All trials will take place on institutional grounds.

Siddharth Tiwari:"When the plants bear fruit for two years, the scientists will analyze which lines are most promising, and those will be chosen for further BRL experiments."

Because the banana crop takes two years to bear fruit, the NABI Mohali team will need at least three years to identify crop lines that show potential for additional

experiments. The team currently has 20 different GM banana kinds that they intend to test.

Mann Ki Baat helped popularize Natural Farming & Agri Drones: ICAR

APRIL 25, 2023 WWW.INDIANCOOPERATIVE.COM

The Prime Minister of India addresses the common mass of the country through a programme called “Mann Ki Baat” on All India Radio in which several episodes have been dedicated to inspire and motivate the farming community of the country.

In order to assess the influence and learning environment among the farmers and other stakeholders, created by Mann Ki Baat, Indian Council of Agricultural Research (ICAR), New Delhi and National Institute of Agricultural Extension Management, (MANAGE), Hyderabad have conducted a study.

Insights from these studies revealed that the natural farming, conservation of natural resources, and willingness to adopt the Integrated Farming Systems (diversification) were the smallholder farmers’ most preferred topics covered in the Mann Ki Baat episodes.

The Mann Ki Baat was perceived as a credible source of inspiration and medium of mass-scale awareness for agriculture and entrepreneurial development. Another assessment with millet farmers revealed that the message communicated through Mann Ki Baat interactions and follow-up actions by the Krishi Vigyan Kendra professionals have strengthened farmers’ perceptions on the process of adoption of improved varieties of millets and production system, and created congenial environment for agri-entrepreneurship.

Additionally, Mann Ki Baat inspired the agri-startups to focus on innovative solutions benefiting the farmers. Digital technology, highlighted in Mann Ki Baat's episode(s), was found to have significant influence on increase in farmers' awareness and knowledge about the use of mobile-based agro-advisory services in the field of adoption of agricultural technology; yield enhancement; and making available the market information.

Similarly, study on agri-drone captured in Mann Ki Baat indicated that the majority of the study farmers (with favorable attitude) perceived drones as useful technology for agricultural operations. However, a significant number of them also expressed the concern of complexity in understanding this technology.

Mann Ki Baat could also create a favorable environment for Farmers Producer Organizations (FPOs) to ease the agri-business, making easy availability of inputs for high value crops, and collective action that could reduce the cost of cultivation of farmers (20-25%). FPO farmers opined that with Mann Ki Baat episodes, they became aware of different policies and schemes of the Government of India promoting agri-businesses.

Study on beekeeping showed that existing resources of this sector got mobilized after the Mann Ki Baat programme. Beekeepers, with better exposure to institutional knowledge and resources, were found to earn better profit in group (Rs. 1,28,328 per 50 bee hives) than individual one (Rs. 92,947). However, 'pesticide residual problems' and 'lack of proper storage facility' were some of the major obstacles faced by the beekeepers. Message on Kisan Rail could also sensitize and mobilize the farmers to avail its services.

The Kisan Rail could facilitate farmers to transport their perishable agri-produce with lesser time that could help in securing their higher net profits with reduced middleman involvement. Furthermore, Mann Ki Baat episodes were also learned to be successful in creating awareness and positive attitude towards organic/natural farming.

Farmers suggested that- if Mann Ki Baat messages on a particular issue in future can be coincided with seasonal activities, it can make even further influence in making the farmers aware. Therefore, we learned that the Mann Ki Baat programme played a valuable role in inspiring and making farmers aware of various agricultural issues.

ICAR app adds Garo language commands

APR 10, 2023 WWW.THESHILLONGTIMES.COM

TURA, April 9: An AI-based website and mobile app, created for identification of pests, diseases and nutrient deficiencies in cashew crop by the Indian Council of Agricultural Research- Directorate of Cashew Research in Puttur, Karnataka, has now been augmented with commands in Garo language to ease the experience of Garo farmers who would use the app. "ICAR Research Complex for NEH Region, Umiam, has included Garo language for easy understanding of people from Meghalaya, especially farmers," a statement issued here informed.

Farming community needs expert advice for management of pests and diseases along with identifying nutrient deficiencies in cashew crops, but advice is not easily available in rural and remote areas.

The mobile app will help the farmersto a great extent and in the long run, the app will help in diagnosing about 60 cashew pests, 20 diseases and 10 nutrient deficiencies instantly from the uploaded images, it added.

"AI and computer vision-based techniques have been used in the app. There are options available for contacting experts and sharing photos on social media in case of no detection or unsatisfactory results. This will help in early forecasting of these

problems and alert farmers in a particular region," the statement by the developers of the app read.

Apart from ICAR-Directorate of Cashew Research, Puttur, scientists of AICRP Cashew centres across the country were involved in the project.

ICAR-CIWA Bhubaneswar Develops New Women Friendly Farm Technology

APR 18, 2023 WWW.ODISHABYTES.COM

Bhubaneswar: At a time when cultivable land for agriculture is shrinking due to increase in population pressure, urbanisation and industrial growth, ICAR's Central Institute for Women in Agriculture (ICAR-CIWA) at Bhubaneswar has developed a new technology to deal with this challenge.

The livelihood of rural families is centered on agriculture and allied activities and in the villages of eastern India most of the households possess a small piece of land besides their home.

To ensure dietary diversity and household nutritional security to the landless farm families, ICAR-CIWA Bhubaneswar team comprising Dr Tania Seth, Dr Arun Kumar Panda and Chaitrali Shashank Mhatre has developed the technology of "Women Friendly Multipurpose Integrated Vertical Nutri-Farming System (IVNFS) for vegetable production with mushroom and poultry".

The low-income families can meet their needs for vitamins, minerals and plant protein through regular access to nutrient rich vegetables, mushrooms, eggs and meat obtained from this system.

It increases farmwomen's resilience to climate vulnerability and offer subsidiary source of income from the sale of small surpluses to the resource poor farm families, said an official release.

A Gujarat-based entrepreneur Japan Shah of Centrifugal Products had approached ICAR-CIWA for licensing of this technology. Hands on training about the IVNFS technology was imparted to the entrepreneur Monday.

An MoU has also been signed for handing over of IVNFS technology between ICAR-CIWA, Bhubaneswar and Centrifugal Products, Gujarat.

During the event, Dr Mridula Devi, Director ICAR-CIWA, Bhubaneswar assured the Gujarat-based entrepreneur that all possible help will be extended for establishment of facilities as per the IVNFS technology.

Bihar Encouraging Farmers to Take Up Cultivation of New Litchi Varieties: Official

APRIL, 29, 2023 WWW.OUTLOOKINDIA.COM

Apart from helping farmers to adopt new methodologies to improve the production of Shahi Litchi, the NRCL is also encouraging them to produce newly discovered varieties of litchi, including 'Gandaki Yogita', 'Gandaki Sampada' and 'Gandaki Lalima', Das said.

To improve the production of litchi in Bihar, the state government and National Research Centre on Litchi (NRCL) are encouraging growers to produce newly developed varieties of the fruit by addressing issues like "productivity gap" and post-harvest management.

Bihar produces 43 per cent of litchi in the country and occupies nearly 35 per cent of the area under cultivation of the fruit in India, state Agriculture Minister Kumar Sarvjeet said.

“Currently, the Bihar government and NRCL (Muzaffarpur) are taking joint initiatives to improve litchi production, its quality and shelf-life. Apart from increasing the production of GI-tagged Shahi Litchi, farmers are also being encouraged to produce newly developed varieties of the fruit”, the minister told PTI.

Efforts are on to grow three new litchi varieties -'Gandaki Yogita', 'Gandaki Sampada', 'Gandaki Lalima'- in the eastern state. The Shahi Litchi, a speciality of the north Bihar district of Muzaffarpur, which earned the Geographical Indication (GI) tag a couple of years ago, stands apart from other varieties by virtue of its unique fragrance, extra-juicy pulp, and smaller-than-usual seed.

India is the second largest producer of litchi in the world, after China. Talking to PTI, Bikash Das, Director, ICAR-NRCL (Muzaffarpur), said, “The contribution of Muzaffarpur district in litchi production is impressive, but there is a need to increase the productivity of litchi.

“The ICAR-NRCL has the mandate to address the productivity gap through basic and strategic research in areas of crop improvement and genetic enhancement, development of sustainable production technologies, integrated pest management systems, and post-harvest management and value addition”.

Since litchi is a non-climacteric fruit that possesses poor shelf life, the post-harvest losses have been assessed to the tune of 18-23 per cent, the official said. “It is another challenge to reduce the losses with suitable post-harvest management tools”, the official said.

Apart from helping farmers to adopt new methodologies to improve the production of Shahi Litchi, the NRCL is also encouraging them to produce newly discovered varieties of litchi, including 'Gandaki Yogita', 'Gandaki Sampada' and 'Gandaki Lalima', Das said.

'Gandaki Sampada', a high-yielding and high pulp containing variety of litchi, developed by ICAR-NRCL, is a late-maturing clone that ripens during mid-June, the official said. "The Gandaki Sampada litchi variety is large (35-42g), and conical in shape. The pulp is creamy-white, soft, and juicy with a pleasant aroma. The variety has good yield potential (120-140 kg/tree)", said the director.

Similarly, 'Gandaki Yogita', is a slow-growing dwarf plant that is tolerant to heat waves. "It has good yield potential (70-80 kg/tree) and its maturity period is from June 5 to June 15. "As far as Gandaki Lalima variety of litchi is concerned, the fruits are conical, bright marigold-orange red in colour. The average yield of this variety is 130-140 kg/tree", said Das.

According to Bihar Economic Survey (2022-23), the production of litchi in the state was 308.1 metric tonnes in 2021-22, whereas it was 308 metric tonnes in 2020-21. Shahi Litchi got the GI tag, thereby becoming an "exclusive brand" in national and international markets, in 2018.

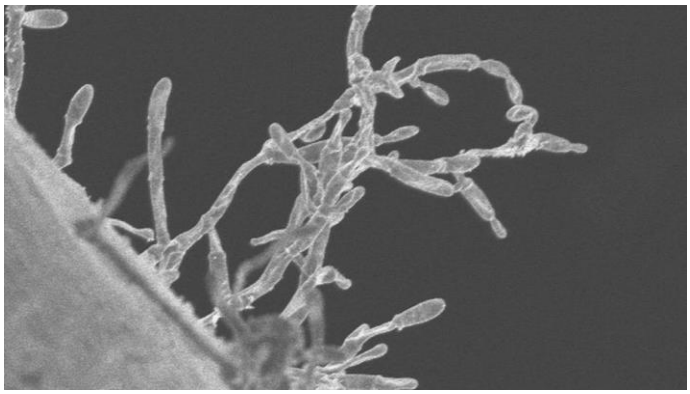
Muzaffarpur, Vaishali, Samastipur, Champaran, Begusarai districts, and adjoining areas of Bihar have a favourable climate for this variety. The Department of Posts recently issued a postage stamp on Shahi Litchi of Muzaffarpur.

IISR IN PRINT

New species of insect pathogenic fungus discovered in Kerala

APRIL 14, 2023 WWW.THEHINDU.COM

A team of scientists representing the IISR made the discovery which has been published in the ***Journal of Invertebrate Pathology.***



A team of scientists led by the Indian Institute of Spices Research (IISR), Kozhikode, have discovered a new species of insect pathogenic fungus with potential biocontrol application. The fungus, isolated from leafhopper pest of Malabar tamarind (Garcinia gummi-gutta), has been named Metarhizium indicum to indicate its Indian origin.

It is found to cause natural epizootics in the leafhopper pest of Malabar tamarind, an evergreen tree spice native to South and Southeast Asia. The discovery of this insect pathogenic fungus against leafhopper is expected to open new vistas of biological control against this pest group.

The scientists' team behind the latest discovery comprises C.M. Senthil Kumar, T.K. Jacob, and S. Devasahayam from IISR Kozhikode, and K.C. Rajesh Kumar from Agharkar Research Institute, Pune. The finding has been published in the Journal of Invertebrate Pathology, a premier international journal that publishes findings on the diseases of invertebrates, including insects.

The team members point out that the leafhoppers cause significant economic damage directly as crop pests or indirectly as vectors of diseases across a variety of crops. According to them, fungi belonging to the genus Metarhizium are regarded as generalist insect pathogens with worldwide distribution and commonly known

as green Muscardine fungus. Several commercial biocontrol formulations based on this fungus are available in the market for organic crop production, they add.

The scientists say the earlier characterisation and identification of Metarhizium species relied mainly on morphological traits, which in general, overlap the species of this genera which had resulted in underreporting of several cryptic species. With the advent of molecular tools, the diversity of this genus was exposed and many cryptic species were elevated as new species and added to the repository of Metarhizium fungi across the world.

Dr. Senthil Kumar, principal scientist with the team, says there is an urgent need for taxonomic re-evaluation of the reported species using modern molecular tools apart from exploiting the latent potential of the fungi. According to him, the focused explorations for identifying cryptic and unreported species can unravel the hidden diversity of Metarhizium in India and lay the foundation for development of several biocontrol formulations for the management of various crop pests, thereby reducing the reliance on harmful insecticides.

Further research in the area proves to be crucial as India has one-third of the global fungal diversity with more than 27,000 reported fungal species. However, taxonomic work on entomopathogenic fungi, especially those belonging to that of Metarhizium lineage, is very minimal, considering the diverse soil and climatic conditions of the Indian sub-continent. Kozhikode IISR Director R. Dinesh says the institute has plans to conduct further studies on the host range of the newly identified fungus against pests of global importance.

GENERAL

Flying tractors a window into future of farming

APRIL 30, 2023 WWW.ECONOMICTIMES.INDIATIMES.COM

Early one recent morning in Vidalia, Georgia, third-generation farmer Greg Morgan launched an AG-230 drone carrying eight gallons of fungicide over a field of sweet onions. The chemical, which is essential to crop survival in this humid state, would typically be dragged and dripped from a 500-gallon tank behind Morgan's 10,000-pound tractor. Now it fell in a fine mist from the spray jets of an 80-pound drone scudding 10 feet above his cash crop. Vidalia Onions are a $150 million local industry that, like peaches, tomatoes and other specialty crops in the Southeast, have become increasingly vulnerable to climate change. Morgan has joined the vanguard of farmers who are turning away from tractors and toward drones as they adapt to the rising cost of chemicals and contend with hotter temperatures, heavier rains, heartier weeds and prolific pests. Farmers have been using drones over the past 20 years mainly for aerial imaging - scanning farms from the sky with cameras to map where crops are thriving and failing. Now drones are being designed for hands-on crop management: enabled to spray herbicides, insecticides and foliar fertilisers with precision, and even to distribute seeds in planting season.A "featherweight flying tractor" - that's how Arthur Erickson, chief executive of manufacturer Hylio Inc., described the company's agricultural drones. The Houston-based startup has seen demand for its drones soar over the past three years; roughly 700 of Hylio's drones are now at work

treating 700,000 acres of cropland annually.Early adopters like 46-year-old Morgan are driving a major shift in the business of food and signaling a reality that investors and leaders of industrial agriculture should heed. Drones are poised to significantly disrupt the tractor industry, and unlike many other high-tech agricultural trends, this one is actually good for small and midsized farmers, and a big win for the planet, to boot.

In the eight months since Morgan made his $40,000 investment it has cut his fuel costs and already reduced his agrochemical usage by about 15%.Bloomberg

Wayanad farmer shows the way with integrated farming of exotic fruits and conventional crops

APRIL 22, 2023 WWW.THEHINDU.COM/

Bibin of Pannikkamthadathil has planted nearly 200 different varieties of exotic fruit plants on his two acres of land, apart from conventional crops such as coffee and black pepper.

At a time when the farming community in the hill district of Wayanad, which is a major coffee, pepper, cardamom and areca nut cultivation region in the State, has been experiencing the harsh realities of climate change, a progressive farmer from Sulthan Bathery has come up with a model in integrated farming with exotic fruits and conventional crops. The experimental fruit garden has also put to test the adaptability of various fruit plants in the hill district.

Bibin of Pannikkamthadathil, a farmer from Moolamkavu in the district, has planted nearly 200 different varieties of exotic fruit plants such as mangosteen, litchi, rambutan, jabuticaba, philosan, duriyan, chammaliang and

miracle fruit on his two acres of land, apart from conventional crops such as coffee and black pepper.

Ginger Market Analysis: Growth, Share, Size, Report, Trends, Forecast 2023-2028

APRIL 27, 2023 WWW.DIGITALJOURNAL.COM

According to a new report by Expert Market Research titled "Global Ginger Market Size, Share, Analysis, Report, Demand, Forecast 2023-2028", the global ginger market was valued at USD 5.85 billion in 2022 and is expected to reach USD 7.58 billion by 2028, growing at a CAGR of 4.6% from 2023 to 2028. The Asia Pacific region is the largest market for ginger, accounting for more than 60% of the global demand. North America and Europe are also significant markets for ginger, driven by the growing popularity of Asian cuisine and the increasing demand for natural and organic food products.

Ginger is a popular spice that is widely used in various cuisines worldwide. It is known for its distinctive aroma and flavor, as well as its health benefits. The global ginger market has been growing steadily over the years, driven by the increasing demand for natural and organic food products. The market is expected to continue to grow in the coming years, driven by various factors such as the increasing popularity of Asian cuisine, the growing demand for healthy and natural food products, and the rising awareness about the health benefits of ginger.

Market Drivers and Restraints:

The growth of the global ginger market is driven by various factors such as the increasing popularity of Asian cuisine, the growing demand for healthy and natural

food products, and the rising awareness about the health benefits of ginger. Ginger is known for its various health benefits such as improving digestion, reducing inflammation, and relieving nausea. It is also used as a natural remedy for colds and flu. However, the market growth may be restrained by factors such as the high cost of production and the availability of substitutes such as synthetic flavors.

Market Segmentation:

The global ginger market is segmented by form, application, and region. By form, the market is segmented into fresh ginger, dried ginger, pickled ginger, preserved ginger, and others. By application, the market is segmented into food and beverages, pharmaceuticals, cosmetics and personal care, and others. The food and beverages segment is further sub-segmented into bakery and confectionery, meat and poultry, sauces and dressings, and others.

Regional Analysis:

The Asia Pacific region is the largest market for ginger, accounting for more than 60% of the global demand. The region is driven by the high consumption of ginger in countries such as China, India, and Japan, where ginger is an essential ingredient in various cuisines. North America and Europe are also significant markets for ginger, driven by the growing popularity of Asian cuisine and the increasing demand for natural and organic food products. The Latin America and Middle East and Africa regions are expected to experience moderate growth in the coming years.

Competitive Landscape:

The global ginger market is highly fragmented, with many players operating in the market. Some of the key players in the market include SA Rawther Spices Pvt. Ltd., Buderim Group Limited, Yummy Food Industrial Group, Archer Daniels Midland Company, Monterey Bay Spice Company Inc., Sun Impex International Foods LLC, Food Market Management Inc., Sino-Nature International Co. Ltd., and The Ginger People.

Recent Developments:

In 2020, Buderim Group Limited launched a new range of ginger products, including ginger pastes and sauces, in response to the growing demand for ginger-based products.

In 2021, SA Rawther Spices Pvt. Ltd. announced plans to expand its ginger processing facility in India to meet the growing demand for ginger in the global market

Fresh black pepper offers opportunities for Dutch cultivation

28 APR 2023 WWW.HORTIDAILY.COM

Pepper is one of the most widely used spices in the world, especially in the dried form. The pepper plant is mainly grown in countries with a tropical climate, such as Indonesia, Malaysia, Brazil, Vietnam, and Cambodia. But an exploratory study by the Greenhouse Horticulture and Flower Bulbs Business Unit of Wageningen University & Research shows that fresh pepper can also be grown well in greenhouses. WUR is therefore looking for growers or other companies that are interested in this.

The black pepper berry grows on a perennial plant that can reach a height of up to 9 meters. The diameter of the berry is between 2 and 6 mm. After harvesting, the berry is usually dried and then powdered into dishes and used in cooking. However, fresh pepper has a much more characteristic taste. There is also still room on the market for fresh pepper, as this product is hardly ever offered on the market.

A few years ago, WUR investigated the cultivation of fresh black pepper in the PPP 'New safe crops from the greenhouse': 5 different varieties were grown in the greenhouses in Bleiswijk (each with their own specific taste). This showed that the crop can be grown well in a greenhouse. The pepper plant can be grown on a high wire, requires a relatively high temperature, and grows best in a shady environment. Pepper is self-pollinating: the male and female flowers are on the same ear, and the female flowers grow into edible berries.

WUR is looking for growers or other companies interested in growing and/or marketing fresh pepper.

Scaling vertical farming: Siemens ensures perfect plant growth

05 APRIL 2023 PRESS.SIEMENS.COM

Traditional agriculture is coming under increasing pressure from climate change: Today indoor farming offers a resource-conserving alternative

Siemens supplies automation and digitalization technologies to make indoor farming safer and more productive

By working with Siemens, indoor farming company 80 Acres Farms can run farms on 100 percent renewable energy, yield 300 times more than conventional farmland, and use 95 percent less water

Growing lettuce in the desert using environmentally friendly methods? Yes, it's possible. Looking ahead, it's important to start developing new concepts for agriculture. By 2050, 10 billion people are expected to live on our planet, and they'll all want to be fed. But new agricultural land is becoming scarce, and more and more farmers are struggling with water shortages. Indoor farming is therefore an

intelligent solution for reliably and energy-efficiently creating perfect growing conditions for plants. This will help meet the growing challenges of food supply and food security.

Optimal plant growth through indoor farming

Indoor farming – often referred to as vertical farming – refers to food production in enclosed spaces. In contrast to conventional greenhouses, however, with indoor farming the environmental influences that the plants are exposed to can be precisely determined. The environment where the plants grow is monitored around the clock: LEDs control how much light the plants receive and the temperature, humidity, CO2 content in the air, and nutrient content in the soil can be modified to foster ideal plant growth. It's also called vertical farming, because the plants are grown in a type of hydroculture called hydroponics in (vertical) pallets stacked on top of each other. This allows the same amount of food to be produced on a much smaller area, and the yield is significantly larger compared to a traditional agricultural area of the same size.

Vertical farming defies climate change

People's environmental awareness is increasing due to the already obvious consequences of climate change. Today many people are much more attentive to how and where their food is produced. Transparent guarantees of origin and a low CO2 footprint are playing an increasingly important role in purchasing decisions. Using blockchain technology, indoor farming makes it possible to transparently trace the path of a plant over its entire lifecycle, from the farm to the kitchen. Indoor farming can also be practiced year-round, unhindered by weather changes, cold snaps, and heat waves. And with indoor farming, production can shift to the immediate vicinity of consumers. As the long transport routes from the cultivation area to the consumers are eliminated, we'll not only receive fresher products, the supply chains will also become more resilient. At the same time, the reduced

transportation results in fewer climate-damaging emissions. In addition, indoor farming can be practiced anywhere in the world, regardless of the local climatic conditions. Until now, food has only been produced where the climatic conditions are favorable and sufficient space is available.

The usable areas for traditional agriculture are limited. Many regions on the planet simply aren't suitable, including deserts, polar regions, and areas that are too mountainous. But we already need to increase our agricultural activity to ensure food security for the growing population. Meanwhile, the soil quality of many conventional agricultural areas is deteriorating as a result of overuse. Climate change and the associated impacts are leading to more and more crop failures. These conditions are creating a downward spiral whose momentum continues to grow.

Indoor farming, on the other hand, has recorded an annual market growth of 25 percent. The market potential for automation and digitalization solutions for indoor farming alone amounts to roughly €3 billion euros.

Scaling vertical farming: 80 Acres Farms and Siemens

The benefits of digitalized vertical farming are even more evident in a recent project conducted by Siemens and 80 Acres Farms, a leading indoor farming company based in Ohio (USA). Through indoor farming, 80 Acres Farms can produce 300 times more food per square meter than a comparable piece of agricultural land using traditional arable farming methods. Compared to conventional agriculture, the plants require 95 percent less water. Of course, indoor farming consumes significantly more energy than growing in an open field. However, the company uses 100 percent renewable energy to run their farms.

Siemens is helping 80 Acres Farms digitalize and scale their indoor farms. Specifically, the project's focus is on developing the loop platform on which all the company's farms are based. The platform was developed by its subsidiary, Infinite

Acres. A holistic approach was a prerequisite for scaling the indoor farms. Siemens provided power distribution equipment and energy and building management technologies that monitor the fire, security, and power distribution systems via a single interface. Our automation and digitalization solutions are also being used to optimize the indoor farms' cultivation and harvesting processes. Robotics and automation optimize production, while edge devices and human-machine interfaces monitor crop management and control the environmental conditions. The project is supported by equity financing from Siemens Financial Services (SFS).

MALAYALAM NEWS

ചായയും മഞ്ഞളുമടക്കമുള്ള ഇന്ത്യൻ ഭക്ഷണങ്ങൾ കോവിഡ് മരണനിരക്ക് കുറയ്ക്കാൻ സഹായിച്ചു :ICMR

APRIL 22, 2023, HTTPS://MALAYALAM.NEWS18.COM/

ഇവയെല്ലാം കാർബൺ ഡൈ ഓക്സൈഡിനെ ഒഴിവാക്കുന്നതിനും കൊവിഡ് 19 രോഗ തീവ്രത ഇല്ലാതാക്കുന്നതിനും സഹായിക്കുന്നുവെന്നാണ് വിദഗ്ധ സംഘം പറയുന്നത്.

ഇന്ത്യക്കാരുടെ ഭക്ഷണരീതി കോവിഡ് മരണനിരക്കും, രോഗ തീവ്രതയും കുറച്ചെന്ന് ഐസിഎംആർ ഇന്ത്യൻ ജേണൽ ഓഫ് മെഡിക്കൽ റിസർച്ചിൽ പ്രസിദ്ധീകരിച്ച പഠനത്തിലാണ് ഇക്കാര്യം വെളിപ്പെടുത്തിയത്. സിങ്ക്, അയൺ, ഫൈബർ എന്നിവയടങ്ങിയ ഭക്ഷണവും ഇന്ത്യക്കാർ സ്ഥിരമായി കുടിക്കുന്ന ചായയും ഭക്ഷണങ്ങളിലെ മഞ്ഞൾ ഉപയോഗം എന്നിവയെല്ലാമാണ് മരണനിരക്ക് കുറച്ചത് എന്നാണ് റിപ്പോർട്ടിൽ പറയുന്നത്.

പാശ്ചാത്യ രാജ്യങ്ങളെ അപേക്ഷിച്ച് ഇന്ത്യയിൽ ജനസാന്ദ്രത വളരെ കൂടുതലാണ്. എന്നാൽ കോവിഡ് സമയത്ത് ഇന്ത്യയിൽ രേഖപ്പെടുത്തിയ മരണനിരക്ക് മറ്റ്

രാജ്യങ്ങളെ അപേക്ഷിച്ച് വളരെ കുറവാണ്. ഇതോടെ ഇന്ത്യയിലെ ഭക്ഷണ ശീലങ്ങൾ കോവിഡ് രോഗ തീവ്രത, മരണനിരക്ക് എന്നിവയുമായി ബന്ധപ്പെട്ടിട്ടുണ്ടോ എന്ന വസ്തുത പരിശോധിക്കുകയായിരുന്നു ശാസ്ത്രസംഘം. തുടർന്നാണ് ഇന്ത്യൻ ഭക്ഷണത്തിലെ ഘടകങ്ങൾ കോവിഡ് 19 രോഗതീവ്രതയെയും മറ്റ് അസ്വസ്ഥതകളെയും പ്രതിരോധിക്കുന്നുവെന്ന് ശാസ്ത്രസംഘം കണ്ടെത്തിയത്. ഇതെല്ലാമായിരിക്കാം മറ്റ് രാജ്യങ്ങളെ അപേക്ഷിച്ച് ഇന്ത്യയിൽ കോവിഡ് മരണനിരക്ക് താരതമ്യേന കുറയാൻ കാരണമെന്നും വിദഗ്ധർ ചൂണ്ടിക്കാട്ടി.

വിഷയത്തിൽ മൾട്ടി സെന്റേർഡ് പഠനങ്ങൾ ആവശ്യമാണ്. പഠനഫലം അനുസരിച്ച് ഇന്ത്യൻ ഭക്ഷണക്രമത്തിലെ പ്രധാന ഘടകങ്ങൾ രക്തനിരക്ക് നിലനിർത്തുന്നു. ഇവയെല്ലാം കാർബൺ ഡൈ ഓക്സൈഡിനെ ഒഴിവാക്കുന്നതിനും കൊവിഡ് 19 രോഗ തീവ്രത ഇല്ലാതാക്കുന്നതിനും സഹായിക്കുന്നുവെന്നാണ് വിദഗ്ധ സംഘം പറയുന്നത്.

കൂടാതെ ഇന്ത്യക്കാർ ദിവസവും സ്ഥിരമായി ചായ കുടിക്കുന്നവരാണ്. ഈ ശീലം അവരുടെ ശരീരത്തിൽ എച്ച്ഡിഎൽ നിലനിർത്താൻ സഹായിക്കും. ചായയിലെ കാറ്റെച്ചിനുകൾ സ്വാഭാവിക അറ്റോർവാസ്റ്റാറ്റിൻ ഹൃദയസംബന്ധമായ ചികിത്സയ്ക്കായി ഉപയോഗിക്കുന്ന മരുന്ന്) ആയി പ്രവർത്തിക്കുന്നതാണ്. ഇവ രക്തത്തിലെ ട്രൈഗ്ലിസറൈഡുകൾ കുറയ്ക്കുന്നു. ഇതിനുപുറമെ എല്ലാ ഭക്ഷണത്തിലും മഞ്ഞൾ ധാരാളമായി ഉപയോഗിക്കുന്നവരാണ് ഇന്ത്യയിലെ ജനങ്ങൾ. ഇത് അവരുടെ പ്രതിരോധ ശേഷി വർധിപ്പിക്കുന്നുവെന്നും വിദഗ്ധർ പറയുന്നു. മഞ്ഞളിലെ കുർക്കുമിൻ കൊവിഡ് 19 രോഗതീവ്രതയും മരണനിരക്കും കുറയ്ക്കുന്നതിൽ പ്രധാന പങ്ക് വഹിച്ചിരിക്കാമെന്നാണ് വിദഗ്ധർ കരുതുന്നത്.

അതേസമയം സംസ്കരിച്ച ഭക്ഷണപദാർത്ഥങ്ങൾ, റെഡ് മീറ്റ്, പാലുൽപ്പന്നങ്ങൾ, കോഫി, മദ്യം, എന്നിവ കൂടുതലായി ഉപയോഗിക്കുന്നവരാണ് പാശ്ചാത്യ രാജ്യത്തുള്ളവർ ഇതാകാം അവിടങ്ങളിൽ രോഗവ്യാപനം വർധിക്കാനും മരണനിരക്ക് കൂടാനും കാരണമായതെന്നാണ് വിദഗ്ധർ പറയുന്നത്.

അതേസമയം, ഇന്ത്യയിലിപ്പോൾ കോവിഡ് വർധിച്ച് വരികയാണ്. ടെസ്റ്റ് പോസിറ്റിവിറ്റി നിരക്കിലും വർധനവ് രേഖപ്പെടുത്തിയിട്ടുണ്ട്. കേരളത്തിലും രോഗവ്യാപനം വർധിക്കുന്നതായാണ് റിപ്പോർട്ടുകൾ സൂചിപ്പിക്കുന്നത്. രോഗവ്യാപനം തടയാൻ മുൻകരുതൽ കൂടുതൽ ശക്തമാക്കണമെന്നാണ് IMA കഴിഞ്ഞ ദിവസം ആവശ്യപ്പെട്ടത്. അടഞ്ഞ മുറികളിലെ ഒത്തുചേരലുകളടക്കം

ഒഴിവാക്കാൻ IMA നിർദേശിക്കുന്നുണ്ട്. ഒമിക്രോണിന്റെ ഉപ വകഭേദമായ ത B B 1.16 ആണ് രാജ്യത്ത് ഏറ്റവും കൂടുതൽ റിപ്പോർട്ട് ചെയ്യുന്നത്.. രോഗലക്ഷണമില്ലാത്തവരിലും രോഗം സ്ഥിരീകരിക്കുന്നുണ്ടെന്നും IMA മുന്നറിയിപ്പ് നൽകിയിരുന്നു.

കോവിഡ് പുതിയ വകഭേദത്തിന് വ്യാപനശേഷി കൂടുതലാണ്. അതിനാൽ സ്വയം പ്രതിരോധമാണ് ഏറ്റവും പ്രധാനം. കോവിഡ് പ്രതിരോധത്തിന് മാസ്ക് ധരിക്കേണ്ടതാണ്. രോഗമുള്ളവരും പ്രായമായവരും കുട്ടികളും, ഗർഭിണികളും പ്രത്യേകം ശ്രദ്ധിക്കണം. അവർ പൊതുസ്ഥലങ്ങളിൽ പോകുമ്പോൾ മാസ്ക് കൃത്യമായി ധരിക്കണം. ആശുപത്രികളിൽ എത്തുന്നവരെല്ലാവരും നിർബന്ധമായും മാസ്ക് ധരിക്കണമെന്നും സർക്കാർ അറിയിച്ചിട്ടുണ്ട്.

കുരുമുളകുചെടിയുടെ പ്രതിരോധശേഷി കൂട്ടാം, അങ്ങനെയൊന്നും വാടില്ല; ദ്രുതവാട്ടത്തിനു പരിഹാരമായി

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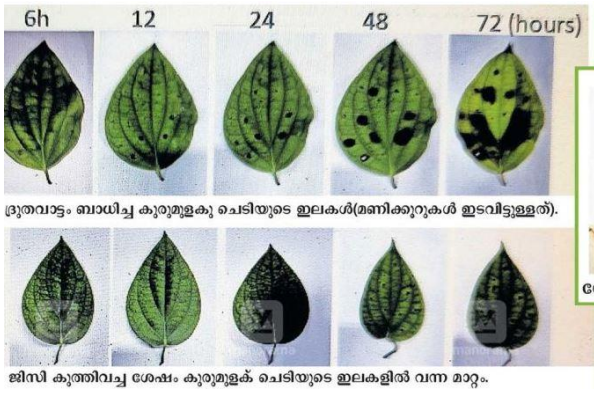
കുരുമുളകിന്റെ വിളലഭ്യതയ്ക്ക് ഏറ്റവും വലിയ വെല്ലുവിളിയാണ് കുമിൾ രോഗമായ ദ്രുതവാട്ടം. കുരുമുളകു ചെടിയുടെ രോഗപ്രതിരോധ ശേഷി വർധിപ്പിച്ചു വിള സംരക്ഷിക്കാനുള്ള കണ്ടെത്തലാണ് രാജീവ് ഗാന്ധി സെന്റർ ഫോർ ബയോടെക്നോളജിയിലെ ഗവേഷക സംഘം വികസിപ്പിച്ചെടുത്തത്. ഇവർ പരീക്ഷിച്ച 'ഡിഫൻസ് പ്രൈമിങ്' എന്ന രീതിയെക്കുറിച്ച് അറിയാം.

എന്താണ് ഡിഫൻസ് പ്രൈമിങ്?

ഫൈറ്റോഫ്തോറ കാപ്സിസി എന്ന സൂക്ഷ്മ ജീവി കാരണമുണ്ടാകുന്ന ദ്രുതവാട്ടരോഗം ബാധിച്ച കുരുമുളകു വള്ളികൾ പെട്ടെന്നു വാടി ഉണങ്ങുകയും പൂർണമായി നശിക്കുകയും ചെയ്യും. സുസ്ഥിരമായ വിള സംരക്ഷണതന്ത്രമാണ് ഡിഫൻസ് പ്രൈമിങ്. ഈ രീതിയിലൂടെ സസ്യങ്ങളുടെ സ്വാഭാവിക പ്രതിരോധ സംവിധാനങ്ങൾ വർധിപ്പിക്കുന്നു.



ദ്രുതവാട്ടം ബാധിച്ച കുരുമുളകു ചെടിയുടെ ഇലകൾ(മണിക്കൂറുകൾ ഇടവിട്ടുള്ളത്).

ജിസി കുത്തിവച്ച ശേഷം കുരുമുളക് ചെടിയുടെ ഇലകളിൽ വന്ന മാറ്റം.

ഡോ.എസ്. മഞ്ജു

കർഷകശ്രീ

പ്രതിരോധം ഇലകളിലൂടെ

ഇലകളിൽ ഗ്ലൈക്കോൾ കൈറ്റോസാൻ കടത്തിവിട്ടു ചെടിയുടെ പ്രതിരോധ ശേഷി വർധിപ്പിക്കാമെന്നാണു ഗവേഷക സംഘം കണ്ടെത്തിയിരിക്കുന്നത്. ഇതിലൂടെ ചെടികളുടെ രോഗ പ്രതിരോധ ശേഷിയും കുരുമുളകിന്റെ തീക്ഷ്ണതയ്ക്ക് ആധാരമായ പൈപ്പറീനിന്റെ അളവും വർധിപ്പിക്കാൻ കഴിയുമെന്ന് രാജീവ് ഗാന്ധി സെന്റർ ഫോർ ബയോ ടെക്നോളജിയിലെ പ്ലാന്റ് ഡിസീസ് ബയോളജി ആൻഡ് ബയോ ടെക്നോളജി വിഭാഗം) ശാസ്ത്രജ്ഞ ഡോ. എസ്.മഞ്ജുള പറയുന്നു.

ചികിത്സ ഇങ്ങനെ

പാകമായ കുരുമുളകുചെടികളുടെ തൈകൾ, വേർപെടുത്തിയ ഇലകൾ എന്നിവയിലാണു പരീക്ഷണം നടത്തിയത്. ചെടികളുടെ പ്രതിരോധ ശേഷി വർധിപ്പിക്കുന്നതും വെള്ളത്തിൽ ലയിക്കുന്നതും വിഷരഹിതവുമായ ഗ്ലൈക്കോൾ കൈറ്റോസാൻ (ജിസി) എന്ന പോളിസാക്കറൈഡാണ് പഠനത്തിനായി ഉപയോഗിച്ചത്. സിറിഞ്ച് ഉപയോഗിച്ചു ഇലകളിൽ ജിസി കുത്തിവച്ചു. 24

മണിക്കൂറിനു ശേഷം ഇവയിൽ കുമിൾ രോഗത്തിന് ആധാരമായ സൂക്ഷ്മാണു കടത്തി വിട്ടു പരീക്ഷിച്ചു. ജിസി കുത്തിവച്ച ഇലകളിൽ രോഗകാരിയായ കുമിൾ രോഗത്തിന്റെ സാന്നിധ്യം ഗണ്യമായി കുറഞ്ഞതായി കണ്ടെത്തി.

സസ്യങ്ങളിലെ പ്രതിരോധ സംവിധാനത്തിന്റെ കാര്യക്ഷമത വർധിപ്പിക്കുന്നതിലൂടെ കീടനാശിനികളെ ആശ്രയിക്കുന്നതു കുറയ്ക്കാൻ കഴിയും. നഴ്സറികളിലും കൃഷിയിടങ്ങളിലും ഇതു വാണിജ്യാടിസ്ഥാനത്തിൽ ഉപയോഗിക്കാൻ കഴിയുമെന്നു ഗവേഷക സംഘം പറയുന്നു. ഗവേഷണത്തിൽ എം.ഇന്ദു, ബി.മീര എന്നിവരും പങ്കാളികളായി.

കൂടുതൽ വിവരങ്ങൾക്ക്: 98462 20379

കണ്ണൂരിലെ മലയോര കർഷകരെ ദുരിതത്തിലാക്കി തെങ്ങിന്റെ കൂമ്പുണങ്ങുന്നു

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ശ്രീകണ്ഠാപുരം: മലയോരമേഖലയിൽ കർഷകരെ ആശങ്കയിലാക്കി വ്യാപകമായി തെങ്ങിന്റെ കൂമ്പുണങ്ങുന്നു. പയ്യാവൂർ, എരുവേശി, നടുവിൽ, കുടിയാൻമല എന്നിവടങ്ങളിലാണ് കർഷകർക്ക് ദുരിതമായി തെങ്ങിന്റെ കൂമ്പുണങ്ങുന്നത്. കായ് ഫലമുള്ള വലിയ തെങ്ങുകളേയും ചെറിയ തെങ്ങുകളെയും ഒരു പോലെ രോഗം ബാധിക്കുകയാണ്.

നിരവധി തെങ്ങുകൾ ചെറിയ കാലയളവിനുള്ളിൽ ഇത്തരത്തിൽ നശിച്ചുകഴിഞ്ഞു. കൂമ്പുചീയലിന്റെ ലക്ഷണങ്ങൾ നിരവധി തെങ്ങുകൾക്കുള്ളതിനാൽ കർഷകർ ഏറെ ആശങ്കയിലാണുള്ളത്. മഴക്കാലത്തും അന്തരീക്ഷത്തിൽ ഈർപ്പം കൂടുതൽ ഉള്ളപ്പോഴുമാണ് കുമിൾ രോഗമായ കൂമ്പുചീയൽ ഉണ്ടാകാറുള്ളത്. എന്നാൽ വേനൽക്കാലത്ത് ഈ രോഗം എങ്ങനെ വരുന്നുവെന്ന് വ്യക്തമല്ല. വില തകർച്ചയും മറ്റു രോഗങ്ങളും കാരണം വലയുന്ന കേരകർഷകർക്ക് ഇരട്ടി

ദുരിതമാണ് കൂമ്പുണങ്ങൽ നൽകുന്നത്. കൂമ്പ് ഉണങ്ങി കഴിഞ്ഞാൽ തെങ്ങുമുറിച്ചു മാറ്റുകയല്ലാതെ വേറെ വഴിയുമില്ല.

രണ്ടുമാസത്തിനുള്ളിലാണ് രോഗം വ്യാപകമായത്. കർഷകർ പലതവണ കൃഷി വകുപ്പ് അധികൃതരെ ബന്ധപ്പെട്ടെങ്കിലും രോഗബാധയുള്ള കൃഷിയിടത്തിൽ ഇതുവരെ സന്ദർശിച്ചിട്ടില്ലെന്ന പരാതി ഉയർന്നിട്ടുണ്ട്.കൃഷി വകുപ്പിൽ നിത്യേനെ വലിയ പരീക്ഷണങ്ങളും പദ്ധതികളും കൊണ്ടുവന്ന് കൊട്ടിഘോഷിച്ച് തുക തുലയ്ക്കുമ്പോഴും തെങ്ങിന്റെ കൂമ്പു ചീയലിനടക്കം മരുന്നുകൾ നൽകാനോ കർഷകരെ സഹായിക്കുന്നതിനോ തയാറാകാത്തത് നാളികേര കർഷകർക്കിടയിൽ വലിയ പ്രതിഷേധങ്ങൾക്കിടയാക്കിയിട്ടുണ്ട്.

ഇസ്രായേൽ കൃഷിപ്പാഠങ്ങൾ പ്രാവർത്തികമാക്കി സുജിത്ത് ചേർത്തല; ഒരു കുഴിയിൽ മൂന്നു വാഴ വെച്ച് തുടക്കം

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ആലപ്പുഴ: സംസ്ഥാന കൃഷി വകുപ്പിൻ്റെ നേതൃത്വത്തിൽ ഇസ്രായേൽ സന്ദർശിച്ചു പഠിച്ച ആധുനിക കൃഷിരീതികൾ പ്രാവർത്തികമാക്കി യുവ കർഷകൻ സുജിത്ത് ചേർത്തല. ഇസ്രായേലിൽ ഒരു കുഴിയിൽ തന്നെ മൂന്നു വാഴ വെക്കുന്ന അതേ രീതി സുജിത്ത് തൻ്റെ കൃഷിയിടത്തിലും പരീക്ഷിച്ചിരിക്കുകയാണ്. ചേർത്തല തെക്ക് ഗ്രാമപഞ്ചായത്തിലെ അർത്തുങ്കലിലെ കൃഷിയിടത്തിലാണ് കൃഷിയിറക്കിയത്. നടീൽ ഉദ്ഘാടനം കൃഷി മന്ത്രി പി പ്രസാദ് നിർവഹിച്ചു.

ഒരേക്കർ വരുന്ന കൃഷിയിടത്തിൽ വിവിധയിനങ്ങളിലെ 1000 ടിഷ്യു കൾച്ചർ വാഴകളാണ് സുജിത്ത് കൃഷി ചെയ്യുന്നത്. ഇസ്രായേലിൽ ഒരു കുഴിയിൽ തന്നെ മൂന്നു വാഴ വെക്കുന്ന അതേ രീതിയാണ് ഇവിടെയും. റോബസ്റ്റ, ഞാലിപ്പൂവൻ, ചെമ്പുവൻ, തുടങ്ങിയ വ്യത്യസ്തങ്ങളായ വാഴ വിത്തുകളാണ് ആദ്യഘട്ടമെന്നോളം പരീക്ഷിച്ചിരിക്കുന്നത്. ഇടവിളയായി വെള്ളരി കുമ്പളം മത്തൻ തുടങ്ങിയ വ്യത്യസ്തങ്ങളായ ഇനങ്ങളും കൃഷി ചെയ്യും. വിളവെടുക്കുന്നവ ലോക്കൽ

മാർക്കറ്റുകളിൽ തന്നെ ബ്രാൻഡ് ചെയ്ത് വിൽക്കാനാണ് ഉദ്ദേശിക്കുന്നതെന്നു സുജിത്ത് വ്യക്തമാക്കി.

ഇസ്രായേൽ മാതൃക പരീക്ഷിക്കുന്ന നൂറുകണക്കിന് കൃഷിയിടങ്ങൾ വരും നാളുകളിൽ കേരളത്തിൽ ഉണ്ടാകുമെന്ന് കൃഷിമന്ത്രി പി പ്രസാദ് പറഞ്ഞു. ഇസ്രയേൽ സന്ദർശിച്ച 27 കർഷകരും അവർ മനസിലാക്കിയ കൃഷിരീതികൾ ആദ്യഘട്ടത്തിൽ സ്വന്തം കൃഷിയിടത്തിലും ശേഷം മറ്റുള്ളവരുടെ കൃഷിയിടത്തിലും നടപ്പിലാക്കുമെന്നും മന്ത്രി അറിയിച്ചു. അതിന്റെ തുടക്കമാണ് സുജിത്തിന്റെ കൃഷിയിടമെന്നും അദ്ദേഹം ചൂണ്ടിക്കാട്ടി.

വെള്ളത്തിന്റെയും വളത്തിന്റെയും ഉപയോഗം പരിമിതപ്പെടുത്തി ആധുനിക ശാസ്ത്ര സാങ്കേതികവിദ്യയുടെ സഹായത്തോടെ ചെലവ് കുറച്ച് കൂടുതൽ വിളവും വരുമാനവും ലഭിക്കുന്ന തരത്തിലുള്ള ഇസ്രയേലിലെ നൂതന കൃഷിരീതി നടപ്പിലാക്കുന്നതോടെ കേരളത്തിന്റെ കാർഷികരംഗത്ത് പുത്തനുണർവ് ഉണ്ടാകും. കേരളത്തിൻ്റെ ചരിത്രത്തിൽ തന്നെ ആദ്യമായാണ് കർഷകരെ കൃഷികാര്യങ്ങൾ മനസിലാക്കുന്നതിനും പഠിക്കുന്നതിനുമായി സർക്കാർ മുൻകൈയെടുത്ത് വിദേശത്ത് അയച്ചതെന്നും മന്ത്രി പറഞ്ഞു.