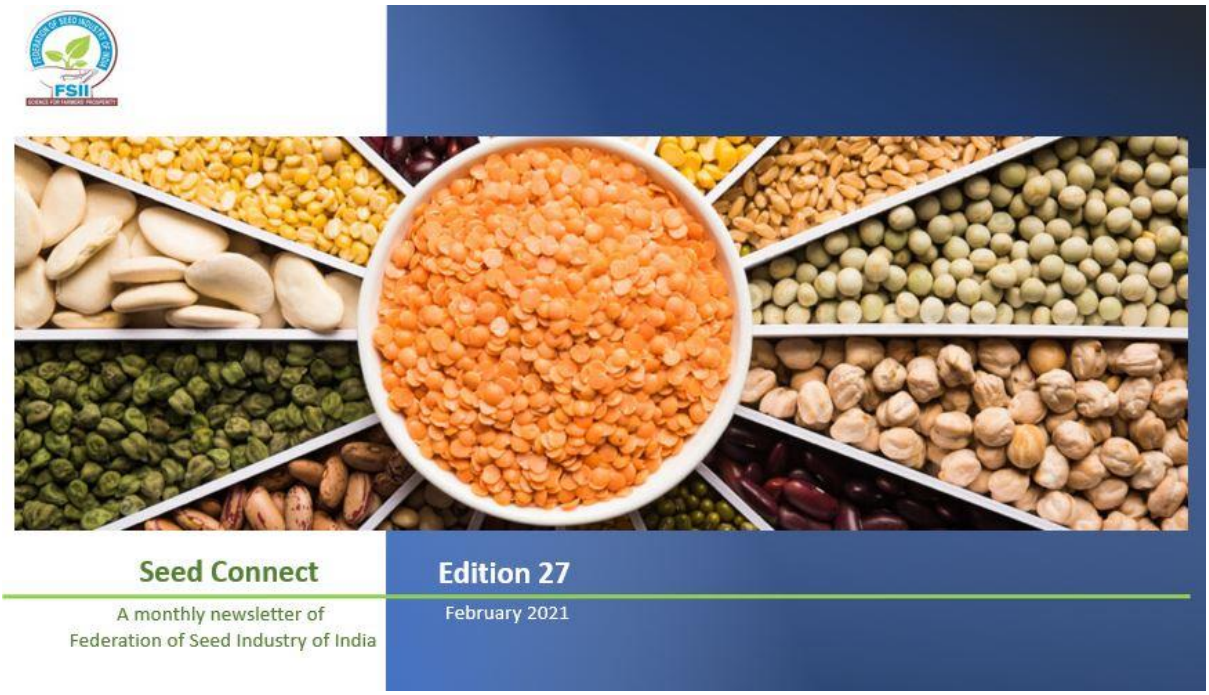

Seed Connect

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Pulse crops are important for maintaining soil health and sustainability of different cropping systems. Introduction of pulses in cereal-cereal based cropping systems such as rice, wheat adds to the sustainability of these systems by ensuring both nitrogen economy and improved soil health. Pulses have low carbon and water footprint as well which make them an integral part of the sustainable farming system. As per estimations, the water footprint for producing one kilogram of meat is approximately five times higher than that of pulses.

Along with the environmental benefits, pulses have health benefits as well – low fat, high protein, high fiber, nutrient density and low glycemic index. When consumed, pulses produce a gradual rise in blood glucose levels developing a longer lasting feeling of satiety.

India is the largest producer and consumer of pulses in the world, however it remains a net importer due to high and continuously growing consumption that exceeds current domestic production capabilities hence a demand supply gap. From socioeconomic point of view, pulses will remain the first preference for people from different strata due to low price and the health benefits that it derives.

A new trend however has been seen in India where interest in the use of pulses and legumes in food formulations and various food and drink categories is emerging, such as meal and meal centres, and snacks. According to Mintel Global New Products Database 2019, there were 1,691 new product launches in India containing pulses as an ingredient between 2014 and 2018. Of those products, 1,680 were launched as food products, while the remaining 11 products were launched as drink products. The top five pulse ingredients in food and drink launches in India between January 2014 and December 2018 were - Black gram 66.3%, pulses 23.4%, red lentil 9.4%, green lentil 2.2% and yellow split peas 1.9%.

India's pulses production has grown to 24 million tonne (240 lakh tonne) from 14 million tonne (140 lakh tonne) in the last five-six years. In 2019-20, India produced 23.15 million tonne of pulses, which is 23.62 per cent of the world output. In 2020-21, it is slated to get a slight boost to 24.42 million tonne.

At a recent event, Union Agriculture Minister of India, Mr Narendra Singh Tomar said that pulses production will remain a high priority area for the Government of India and will find a

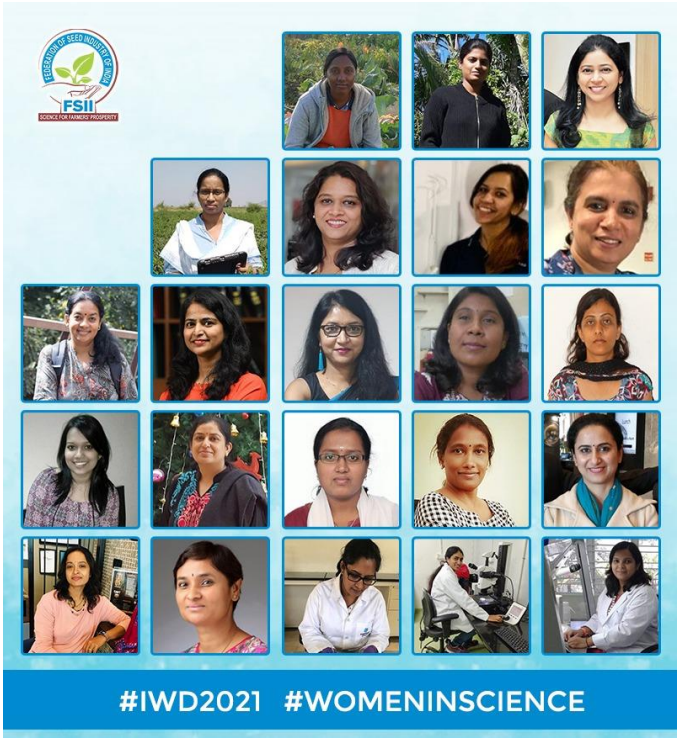
place in National Food Security Mission. He further informed that Indian Council of Agricultural Research has played an important role in increasing pulses production. Pulse crops research has received new direction and unprecedented work has been done towards developing new and improved species. More than 100 improved and high yielding species have been developed in 5 years. The government is focusing on improving varieties of seeds, bringing new areas under pulses cultivation and market, which will help in increasing the profit of the farmers.

Along with these initiatives, access to good quality seeds, embracing new technologies, skill building of farmers for sustainable production, boosting investment in R&D through the new science technology and innovation policy 2021, we hope that India soon achieves self sufficiency in pulses production, drive profits for farmers and supports consumers as a major nutritional intake.

In this newsletter we have also covered news around several important developments on agriculture across India, globally and in the area of research. We hope you find it a good read!

Shivendra Bajaj
Executive Director
Federation of Seed Industry of India

This International Women's Day we are bringing stories of incredible women from the seed industry to showcase how their work in the field of science and agriculture.
Keep an eye on our social media pages to read them!



News from India and Around the World

Karnataka to soon unveil policy framework on agriculture start-ups
(Business Standard)
Karnataka Agriculture Minister B C Patil said that the Government would soon unveil a policy framework on agri start-ups and operational guidelines. Patil said agri start-ups can provide missing links in the agricultural value chain and deliver efficient, innovative products, technologies and services to farmers and consumers.

FPOs show the way of turning agriculture into a profitable venture
(The Hindu Business Line)
Aggregation of small and marginal farmers in FPOs helped to enhance market linkages and improving their income. More than 86 per cent of farmers in the country are small and marginal. But many of these small farmers have joined hands to form Farmer Producer Organisations (FPO), and in States like Maharashtra, they have turned agriculture into a profitable venture.

National Mission for Sustainable Agriculture Helps Ritti Villagers Increase Incomes
(Business World)
The locals of Ritti village in Udhampur district, which recently became the first Panchayat to be adopted under the National Mission for Sustainable Agriculture (NMSA) in Jammu and Kashmir, are buying cattle under the scheme to increase their source of income. As per Subhash Chander Sharma, Chief Agriculture Officer, Udhampur, under NMSA, the administration is giving the farmers a subsidy of 50 per cent on small ruminants to help them sustain and double their income. NMSA will help the farmers sustain and increase their income along with traditional agriculture. They can buy cows, buffalos, and goats under the scheme which will help them get an additional mode of income.

Smart farming technology can transform Chinese agriculture and help feed the planet
(Global Times)

Among all the nations in the world, China has the largest population and thus the most mouths to feed. The well-being of our own people depends on our ability to feed ourselves with safe, nutritious food that is grown sustainably. This is not easy, given that we have 20 percent of the world population but only 7 percent of its arable land. China's successful development over recent years has also contributed to a shortage of good farmland as well as a strain on water supplies. Beyond our borders, the whole world faces an urgent need to collaborate on climate change and environmental protection.

Global agriculture will be drastically altered by climate change
(Green Biz)
"Climate change reshapes the relationships among crops, pests, pathogens and weeds," Zarei said. "And it intensifies several trends, including declines in pollinating insects, increasing water scarcity, increasing ground-level ozone concentrations and fishery declines. Climate change [has] posed pressures on availability of water resources for agriculture by shifting precipitation patterns, earlier seasonal snowmelt and intrusion of saltwater into coastal aquifers." It is true that some areas of the world are becoming more arable in the face of climate change, especially the Arctic. The warming planet pushes the agricultural frontier poleward and into carbon-rich areas of thawed permafrost and peatland. "The climate envelope moving means that certain areas are now able to support different types of habitats," Berhe said. "But I think it's a little hard to call that improving soil health because of the way we got there."

Michael McCormack says agriculture could be excluded from 2050 net zero emissions target
(The Guardian)
The Coalition is facing an increasingly testy party room as it struggles to land on a climate policy, with the Nationals leader, Michael McCormack, declaring he is "not worried about what might happen in 30 years' time". The deputy prime minister said excluding agriculture from Australia's attempts to reach net zero emissions by 2050 may be one option. The prime minister, Scott Morrison, has said he would like to see Australia reach such a target but has not formally committed to it. New Zealand has set a framework for its path to net zero emissions by 2050 but has provided an exemption for farming.

Agriculture could help investors reach carbon-reduction goals – report
(P&I Online)
ESG and impact investors working toward a net-zero carbon economy should not overlook the role of agriculture, according to a report released by U.S. Farmers and Ranchers in Action. The report, "Transformative Investment in Climate-Smart Agriculture: Unlocking the potential of our soils to help the U.S. achieve a net-zero economy," said farmers and ranchers are using climate-smart practices but need more investment to bring them to scale. So far, agriculture is typically not part of growing ESG portfolios, "a huge, missed opportunity," according to the report produced with The Mixing Bowl, the Croatan Institute and the World Business Council for Sustainable Development.

Ministry of Civil Aviation allows drone use to gather agriculture data
(The New Indian Express)
The Ministry of Civil Aviation has allowed drone deployment by the agriculture ministry for remote sensing data collection in 100 districts of the country, for gram panchayat level yield estimation, under the Pradhan Mantri Fasal Bima Yojana. Earlier, the agriculture ministry had sought nod for allowing short-listed private agencies to operate drones to capture images of rice fields in these districts to assess crop yields. A government official said drone-based images are important inputs in the models for crop yield estimation and validation.

Agri-market freedom, water accounting could address few problems of agriculture in India
(The Indian Express)
If I say that Indian agriculture has the potential to double or even triple its output in the next 15-20 years, many people will laugh it away. But the reality is that many countries have done it and we can do it, too, provided our agri-food policy framework takes a dramatic turn, from being subsidy-led to investment-driven, from being consumer-oriented to producer-oriented, and from being supply-oriented to demand-driven by linking farms with factories and foreign markets, and, finally, from being business as usual to an innovations-centred system. At least this is what we can learn from a

comparative study of Indian, Chinese and Israeli agriculture in a just released book, From Food Scarcity to Surplus — Innovations in Indian, Chinese, and Israeli Agriculture by Ashok Gulati, Yuan Zhou, Jikun Huang, Alon Tal, and Ritika Juneja (Springer Nature, 2021).

Agriculture Successful in Sequestering Carbon, More Research Needed

(Fb)

During 2018, carbon sequestration efforts resulted in an increase in CO2 stocks, that means that's carbon removed from the atmosphere of more than 760 million metric tons. So, when you take into consideration total emissions across the entire U.S. economy, our carbon sequestration efforts resulted in about a 12 percent reduction in emissions, that we were able to capture that carbon in the soil. When you look over the last 30 years, we've lost more than a million acres of cropland each year and that's not sustainable. In order to capture more carbon in our soils we need to increase our investment in agricultural research to develop those frontier technologies that can help us capture even more carbon in the soils on our cropland, so we can not only meet the climate goals, but also to continue to feed, clothe and provide renewable fuels for the U.S. economy.

India contributes nearly 24% to global pulses production: Tomar

(Mint)

India is the largest producer and consumer of pulses in the world, contributing nearly 24 per cent to the global output, Agriculture Minister Narendra Singh Tomar said. He further said the country's pulses production has grown to 24 million tonne (240 lakh tonne) from 14 million tonne (140 lakh tonne) in the last five-six years.

Agriculture needs major investment to grow

(Herald)

Australian agriculture will need an injection of $87 billion in new investment over the next decade to meet the sector's ambitious 2030 farm gate production target. The National Farmers' Federation has set a government-endorsed goal of boosting production to $100 billion by 2030 from about $61 million this financial year. But a new AgriFutures report released on Monday warns capital investment in agriculture has fallen behind over the past 10 years. The Natural Capital Economics paper estimates $8.7 billion a year in new investment will be needed over the next decade to achieve the growth. Australian Bureau of Statistics data indicates that average annual net investment in the sector has been about $1.2 billion over the past 30 years.

Gujarat agriculture department wins two national awards

(The Times of India)

Gujarat Government's Agriculture & Farmers' Welfare Department has won two prestigious national awards, one under ambitious Pradhan Mantri Kisan Samman Yojna and the other for technological innovation in the agricultural sector. The Central Government has announced the Best Performance Award under the Grievance Redressal Category to the tribal Dahod District under the Pradhan Mantri Kisan Samman Nidhi (PM-Kisan) Scheme.

Huge potential to expand US agriculture exports beyond top markets: USDA official

(HSN Worldwide)

Nearly 40% of agriculture exports from the US are sent to markets outside the top six importing regions, and those are the markets of interest and growth, Jason Hafemeister, the USDA's acting deputy undersecretary for trade and foreign agriculture affairs, said during the USDA's Agriculture Outlook Forum. The top six markets for US agriculture exports are China, Canada, Japan, Mexico, EU+UK and South Korea. Hafemeister said Vietnam, Taiwan, Philippines, Indonesia, Colombia, Hong Kong, Egypt, Thailand and India are developing countries with growing economies and growing populations, and which can serve as major markets for US agriculture products.

The Environmental Upside of Modern Farming

(WSJ)

If you wanted to produce food at the lowest cost to the environment, what methods would you use? Would you select modern farming methods (large-scale, specialized, mechanized and increasingly

digital), or would you opt for traditional farms that are small and low-tech? Environmentalists often prefer the latter, having seen the damage that modern farms can do. But the sustainability of traditional American farming was mostly an illusion. Farm production in the U.S. has nearly tripled over the past 70 years, according to the U.S. Department of Agriculture, and trying to pull that off using the low-tech methods of the past—which delivered lower yields per acre—would have meant that more forests would have been lost, more fragile lands plowed and more natural habitats destroyed. Modern farming is better because it uses low-impact, "precision" techniques that require less land, less energy and fewer chemicals for every bushel produced. The secret has been to incorporate tools that use sensors, information and communications technology, big data, and even machine learning to reduce farming's dependence on material resources.

First Person: Digging for victory in the Philippines

(UN News)

Louise Mabulo has been recognized as a prodigy of the culinary world since the age of 12, when she appeared on the Filipino version of the TV show Junior Masterchef. Since then, she has won several awards for her cooking, and has become a world-renowned social activist. Ms. Mabulo, a 2019 UN Environment Programme (UNEP) Young Champion of the Earth, is the founder of The Cacao Project, which works to improve the livelihoods of Filipino farmers in the Bicol Region, by reviving barren lands through tree planting, creating economic forests and nurseries, and promoting fair trade and reforestation. "As a chef, I am frequently in contact with farmers. These discussions gave me a good insight into the problems with the food system in the Philippines: where there are gaps, and where there is over-supply. This prompted me to start farm-to-table dinners, using only local ingredients. When Bicol region was hit hard by a typhoon, I began a relief effort for farmers, but I realised that this could only have a superficial effect on their lives, so I oriented my career towards agriculture.

'Perfect storm': Philippine agriculture shrinks 1.2% in 2020

(Rappler)

Philippine agriculture contracted by 1.2% in 2020, after tropical cyclones during the 4th quarter wiped out surprise gains posted in the previous months. Crops, livestock, poultry, and fisheries recorded decreases during the 4th quarter, pulling down overall farm output during the period to a 4-year low of -3.8%. At current prices, however, the value of agricultural production amounted to P503.8 billion, 5% higher than in 2019. In 2020, the sector faced the Taal Volcano eruption, African swine fever, lockdowns due to COVID-19, and strong tropical cyclones.

New $60m fund to boost food production by harnessing tech

(The Straits Times)

Some $60 million will be set aside for a new fund to help farmers better harness technology in local food production, Deputy Prime Minister Heng Swee Keat said. "Technology is a game changer and will open new possibilities. We harnessed technology to overcome our water and land constraints, and will do the same for climate change," he said. The symptoms of climate change include more frequent extreme weather events, which could disrupt global supply chains and threaten global food production. But the use of technology could cushion the agriculture sector from erratic rainfall patterns and climbing temperatures.

Indoor farming gains ground amid pandemic, climate challenges

(Aljazeera)

Now, indoor farms are positioning themselves as one of the solutions to coronavirus pandemic-induced disruptions to the harvesting, shipping, and sale of food. "It's helped us change the narrative," said Jadavji, whose company runs a vertical farm in Ontario, and is building others in New York and New Zealand. Proponents, including the US Department of Agriculture (USDA), say urban farming increases food security at a time of rising inflation and limited global supplies. North American produce output is concentrated in Mexico and the US southwest, including California, which is prone to wildfires and other severe weather.

Grape idea: Hokkaido University's sustainable robots offer respite for wine and pumpkin farmers in Japan

(Food Navigator)
Robots developed by researchers at Hokkaido University are being trialled at a Japanese vineyard, Hokkaido Wine, for pesticide spraying and weed control. Hokkaido wine approached robotic agriculture epxert, Professor Noboru Noguchi from the research faculty of Agriculture at Hokkaido University for collaboration. The Professor has been working on agriculture robots for more than 20 years, is trialling unmanned robots on the vineyard, using technology developed in his laboratory. The robots are fitted with high-accuracy GPS to allow precise navigation. On the vineyard, through AI and 5G technologies, the robot can detect precipitation and areas requiring spraying.

Green shoots: Rooftop farming takes off in Singapore

(Phys.org)
On the rooftop of a Singapore shopping mall, a sprawling patch of eggplants, rosemary, bananas and papayas stand in colourful contrast to the grey skyscrapers of the city-state's business district. The 10,000 square-foot (930 square-metre) site is among a growing number of rooftop farms in the space-starved country, part of a drive to produce more food locally and reduce a heavy reliance on imports. The government has championed the push amid concerns about climate change reducing crop yields worldwide and trade tensions affecting imports, but it has been given extra impetus by the coronavirus pandemic.

Authorities will not 'dictate' farming methods as Singapore pushes for increased productivity: Grace Fu

(CNA)
The authorities will not "dictate" farming methods even as Singapore pushes for increased productivity, said Minister for Sustainability and the Environment Grace Fu. Ms Fu was speaking during a question-and-answer session at her ministry's 2020: Singapore Food Story appreciation event, which was live streamed on the Ministry of Sustainability and Environment's (MSE) Facebook page. "We will help, we will not dictate, we will not say that you have to use a high-tech way or other," said Ms Fu, who was responding to a question on whether Singapore's shift to high-tech farming would leave behind some traditional farmers and possibly leading them to close their farms.

Grape expectations: novel superfood seaweed farm launched in Singapore

(The Fish Site)
Stemcell United (SCU) has successfully trialled the application of plant stem cell technology on sea grape cultivation at its research base located in the Marine Aquaculture Centre on St John Island, Singapore. SCU is now moving towards commercial cultivation through the creation of the joint venture with Blue Aqua. The joint venture aims to create an integrated aquaculture farming system, with plans to promote the ocean vegetable's unique qualities as a sustainable superfood and plant-based protein.

Odisha to get regional pulses research centre at Khurda

(The New Indian Express)
In a bid to boost pulses production in the State, Union Minister for Agriculture and Farmers Welfare and Food Processing Industries Narendra Singh Tomar laid the foundation stone of a regional centre of Indian Pulses Research Institute (IIPR) at Khurda on the occasion of the World Pulses Day. Laying the foundation stone through virtual mode from New Delhi, Mr Tomar said that better species and high-quality seeds are major components of a good crop. He said the regional centre will help the State to enhance pulses production and productivity of the crops.

New Research

Environmentally sound farming for the betterment of humanity

(CIO)
AeroFarms is on a mission to transform agriculture with environmentally responsible farming that enables local production at scale and nourishes communities across the globe with safe, nutritious and delicious food. The company has been leading the way for indoor vertical farming and agriculture, from genetics to post harvest. AeroFarms has grown more than 850 different varieties of crops, and

the company now sees the potential to extend into other markets, such as pharmaceutical, cosmeceutical and nutraceutical. This broad vision is all part of the AeroFarms commitment to making the world a better place. AeroFarms is currently developing of the world's largest indoor vertical farm of its kind in Abu Dhabi, the capital of the United Arab Emirates. The farm will be dedicated to state-of-the-art research and development (R&D) and commercialization of relevant local crops using AeroFarms' expertise and proprietary indoor vertical farming technology.

Noble Research Institute focuses on regenerative agriculture
(The Fence Post)
Noble Research Institute announced that it will focus all of its operations on regenerative agriculture and set its primary goal to regenerate millions of acres of degraded grazing lands across the United States. Noble will achieve the vision through its direct work with farmers and ranchers across the nation as they make the transition to and profitably maintain regenerative management of their lands. Regenerative agriculture is the next step in the land stewardship journey wherein farmers and ranchers reduce their reliance on conventional practices and concentrate on restoring or regenerating the soil. The soil is the cornerstone of a healthy ecosystem and a productive farm or ranch.

Novel analytical tools developed by SMART key to next-generation agriculture
(Eurekalert)
Researchers from the Disruptive & Sustainable Technologies for Agricultural Precision (DiSTAP) Interdisciplinary Research Group (IRG) of Singapore-MIT Alliance for Research and Technology (SMART), MIT's research enterprise in Singapore, and Temasek Life Sciences Laboratory (TLL), highlight the potential of recently developed analytical tools that are rapid and non-destructive, with a proof of concept through first-generation examples. The analytical tools are able to provide tissue-cell or organelle-specific information on living plants in real-time and can be used on any plant species.

Biosensors monitor plant well-being in real time
(Eurekalert)
Researchers at Linköping University, Sweden, have developed biosensors that make it possible to monitor sugar levels in real time deep in the plant tissues - something that has previously been impossible. The information from the sensors may help agriculture to adapt production as the world faces climate change. The results have been published in the scientific journal iScience.

Student's research makes healthy indoor plants more attainable
(Hortidaiy)
Adhikari's research focuses on developing and improving smart sensors to measure nitrogen in plants. She also aims to understand plant responses to nitrogen supply and optimization. Using data that Adhikari generated, the Nemali Lab has developed affordable smart sensors that use smartphone images to analyze plant traits, including nitrogen status.

New variety of dwarf cashew released
(The Hindu)
A new variety of dwarf cashew was released by the Directorate of Cashew Research, under the Indian Council of Agricultural Research, at Puttur in Dakshina Kannada. Speaking after releasing the variety, which has been named as Netra Vaman, during the Cashew Day at Puttur, Principal Scientist (Horticulture) M. Gangadhara Nayak said that its each nut, small in size, weighed between 5.5 grams and 6 grams. The weight of its medium size apple stood at 50 grams.

Researchers Identify Key Herbicide Resistance Gene in Ryegrass
(ISAAA)
Researchers from the Australian Herbicide Resistance Initiative (AHRI) have identified a key gene in annual ryegrass that is responsible for the weed's resistance to seven different herbicide chemistries from five modes-of-action. AHRI director and The University of Western Australia (UWA) Professor Hugh Beckie said that their work is the first identification in the world of a single gene, CYP81A10v7 in ryegrass, which is responsible for metabolic resistance to herbicides across several different modes-of-action. Professor Beckie said that their discovery has the potential to develop a rapid diagnostic

marker or group of markers for screening other herbicide resistant annual ryegrass populations to identify the most-effective herbicide options available. Annual ryegrass is considered a major weed in Australian cropping systems.

Researchers Discover Gene Promoting Rust Fungal Infection in Wheat

(ISAAA)

Researchers have found a gene in wheat that promotes rust fungal infection. The wheat gene TaBCAT1 was found turned on early during a successful yellow rust infection. Deleting this gene in wheat mutants severely reduced infection, revealing its importance for rust fungi to cause disease. Disrupting the gene provides resistance to yellow and stem rust, two of the most economically damaging diseases of wheat worldwide. Further analysis of the TaBCAT1 gene showed that it takes part in the breakdown of a particular group of amino acids called branched-chain amino acids. The team also found that the amount of these amino acids was different in wheat plants during successful and unsuccessful rust infections, showing that their amount could be important for the invading pathogen.

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