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MUNG CENTRAL

The International Mungbean Improvement Network (IMIN) is collaboration between the World Vegetable Center and international partners across India, Bangladesh, Indonesia, Myanmar, Australia and Kenya to breed new mungbean lines hoping to uncover desirable traits for improved production across partner countries. This work is funded by the Australian Center for International Agricultural Research (ACIAR).

Editorial

This edition covers diverse research stories on prospects of mungbean crop in Indonesia, *Vigna* conservation strategy, genes responsible for heat tolerance in *Vigna* species, mungbean flowering behaviour, identification of resistant sources against anthracnose disease in mungbean mini-core collection, updates on Australian mungbean breeding program, details of two new mungbean varieties released for Tanzania and a success story on how a new ready-to-eat mungbean product has potential to impact the mungbean production in Kenya. We welcome new collaborations to the IMIN family.

It is time to step forward with reflection. Recently, the first phase of the IMIN (2016-2020) project received positive comments from the external review committee and the final report was published. We are geared up for the second phase of IMIN (2021-2025) project, and we have a long way to go.

If you are interested in finding out more about the project or interested in collaboration with the IMIN, please write to ramakrishnan.nair@worldveg.org.

We hope you enjoy this ninth edition of Mung Central.

To access previous editions, visit: https://www.aciar.gov.au/search?search_api_fulltext=mung+central

International Mungbean Improvement Network Phase 1 (IMIN 1) final report published

Contributed by: Sunil Chaudhari, Aparna S and Ramakrishnan M Nair, WorldVeg, India

Under the umbrella of IMIN 1, mungbean mini-core collection (296 accessions) and improved breeding lines (AVMU lines) from WorldVeg were shared among the partners. Some shared materials were quickly adopted in partnering countries in several ways. In India, National Agricultural Research System (NARS) selected 2 AVMU lines for multi-location testing. In Bangladesh, 3 improved breeding lines outperformed the existing popular mungbean variety BARImung-6 in yields. While, in Myanmar, 7 AVMU lines and 2 mini-core accessions showed superior agronomic traits. In Kenya, farmers preferred 2 AVMU lines that were early maturing, high-yielding and high in iron content. Similarly, promising lines for Tanzania and Uganda were identified for further testing and potential release.

In the first phase of IMIN, the entire mungbean mini-core collection was genotyped with 24,000 single nucleotide polymorphism markers. Further, attempts were made to map the traits of interest, such as disease resistances and agronomic traits, through genome-wide association studies. In addition resistant resources were identified for diseases such as yellow mosaic disease (MYMD), powdery mildew, and dry root rot, tan spot, halo blight and insect pests such as aphids and thrips from the mini-core collection. IMIN also trained partners to use KDDart, plant breeding data management system.

A workshop on "Enhancing farmers' access to improved mungbean varieties and good agricultural practices in Southeast Asia" was conducted during 2019 in Thailand to improve mungbean production knowledge among the farmers. A virtual workshop, 'Demand-Led breeding approaches' was conducted for mungbean breeders and scientists during 2021. This workshop enhanced the understanding of market segmentation in each country and developed country specific mungbean product profiles.

The success of the IMIN 1 has led to the extension of the project to the second phase (IMIN 2) from 2021 to 2025. The major focus in IMIN 1 would be on making the genomic resources such as trait-linked diagnostic markers available for the mungbean breeding programs, screening the germplasm and advanced breeding lines for abiotic stresses including heat, water deficit stress, and water logging tolerance.

For more details, please refer to the IMIN 1 final report using the following link: https://www.aciar.gov.au/publication/cim-2014-079-final-report

Utilization of mungbean in Indonesia

Contributed by: Rudy Soehendi, Eriyanto Y, Emerensiana U, Dian Adi AE, Trustinah and Made JM, ILETRI, Indonesia

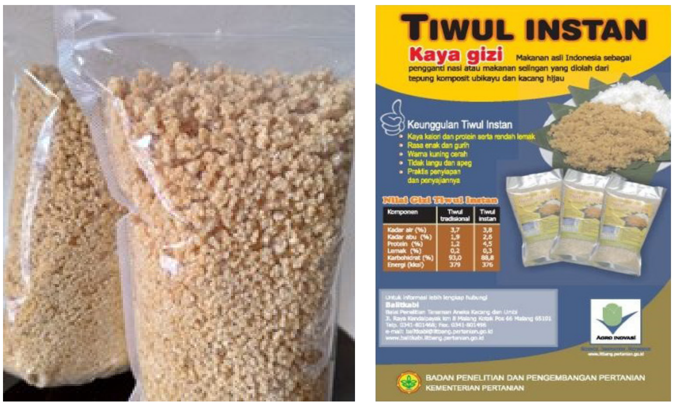
Mungbean is an important food crop in Indonesia. This crop is the third most essential legume after soybean and peanut. The crop is popular in Indonesia because it can grow in tropics with altitudes of 500-700 m above mean sea level, has early maturity (55-65 days), drought tolerance and, is adaptive to less fertile land (suboptimal conditions). Mungbean is also considered as an essential cash crop due to its short duration and relatively stable price in the market. In Indonesia, the average annual mungbean production is 249,017 tons with a productivity of 1.16 ton/ha while the demand reaches up to 304,000 tons. The crop is majorly grown in seven provinces of Indonesia and each production region has its unique preferences and utilization patterns for mungbean varieties (e.g., large and small sized seed, seed color, and maturity duration). The future mungbean breeding program is aimed at developing high yielding varieties with >2 t/ha yield, synchronous pod maturity, resistance to biotic and abiotic stresses. One of the important diseases leading to significant yield losses up to 80% in Indonesia is powdery mildew. New superior varieties which are resistant to powdery mildew infection need to be developed.

Indonesian Legumes and Tuber Crops Research Institute (ILETRI) has released 24 superior varieties for different mungbean growing areas as a component of mungbean cultivation technology. The productivity of several released varieties accepted by farmers includes Vima 1, Vima 2, Vima 3, Vima 4, Vima 5, Vimil 1 and Vimil 2 with a yield potential of 1.76 to 2.34 t/ha.

Mungbean provides an essential source of dietary protein at relatively affordable cost to the population. Thus, it can be used for supporting national Indonesian program to overcome malnutrition (stunting) in some parts of Indonesia. There is an increasing demand for mungbean as raw materials (grains) in preparation of processed food products from household industries and commercial industries. Some processed mungbean products prepared from home industries include porridge, as filler in traditional snacks (*bakpao, yangko, onde-onde and bakpia*), traditional snacks and drinks (*satru, peanut brittle, dawet/cendol*) and mungbean sprouts. Yogyakarta region has over 90 bakpia producing industries, and they need ~550 tons of mungbean each year. At the medium and large industrial levels mungbean flour is used as starch for baby food, vermicelli, nutritious drinks such as milk, yogurt and mungbean juice. Mungbean flour mixed with cassava flour in the ratio of 20:80 to produce instant *tiwul* (traditional snack food) can increase protein contents of the product from 1.3% to 4.5%.

The utilization of mungbean as raw material in bakpia product in Yogyakarta region.

Picture Source: https://www.idntimes.com/, https://myeatandtravelstory.wordpress.com/; https://jogja.idntimes.com/



The utilization of mungbean flour as a composite with cassava flour to produce instant tiwul (traditional snack food).

Picture Source: https://balitkabi.litbang.pertanian.go.id/leaflet/tiwul-instan/

The private seed companies are collaborating with ILETRI for seed propagation and marketing. A private company, East West Seed Indonesia (EWINDO) has signed with ILETRI in 2019 to produce a projected demand of 1800 tons of Vima 1 variety by 2023. In 2020, the ILETRI provided a license to a national seed company, Agri Makmur Pertiwi to produce and market mungbean varieties Vima 4 and Vima 5.

Global *Vigna* Conservation Strategy

Contributed by: Sunil Chaudhari and Ramakrishnan M Nair, WorldVeg, India

The genus *Vigna* Savi. is one of the agriculturally important genera contributing to food and nutritional security across the globe. It is one of the unique genera having a maximum number of domesticated crops with interesting domestication history. The crops such as mungbean (*Vigna radiata* (L.) R. *Wilczek var. radiata*), black gram, (*V. mungo*), cowpea (*V. unguiculata*), moth bean (*V. acontifolia*), azuki bean (*V. angularis*), rice bean (*V. umbellata*), creole bean (*V. reflexo-pilosa*), tuber cowpea (*V. vexillata*) and bambara groundnut (*V. subterranea*) are mainly distributed in Asia and Africa. The genus *Vigna* is named after Domenico *Vigna*, a seventeenth-century Italian botanist. The Vigna is a large pantropical genus with over 100 species distributed among seven subgenera *viz. Ceratotropis, Haydonia, Lasiosporon, Macrorhyncha, Plectotropis, Sigmoidotropis* and *Vigna*.

The World Vegetable Center (WorldVeg), Taiwan with funding support from the Global Crop Diversity Trust (the Crop Trust) is leading an initiative to develop a Global *Vigna* Conservation Strategy (GVCS) partnering with the gene banks and research institutes working on *Vigna* improvement and conservation across the globe. The GVCS will mainly focus on economic importance, domestication, taxonomy and nomenclature, centers of diversity, existing *ex-situ* collections including assessment of current compositions, and identifying gaps in collection, conservation, characterization, evaluation, distribution, safety duplication, capacity, and risk management. The GVCS would be available in open access for research across the world, with recommendations and a plan for a more efficient and effective system of *Vigna* genetic resource conservation.

If you want to know further about the GVCS initiative, please contact Dr. Ramakrishnan M Nair, (ramakrishnan.nair@worldveg.org) or Dr. Sunil Chaudhari (sunil.chaudhari@worldveg.org).

Role of late embryogenesis abundant (LEA) protein gene family revealed in heat tolerance in *Vigna* species

Contributed by: CM Singh and Aditya Pratap, ICAR-IIPR, India

The heat stress negatively affects the seedling vigour, biomass accumulation and reproductive development in mungbean besides the reproductive traits *viz.*, flower initiation, pollen viability, stigma receptivity, ovule size and viability, fertilization, pod set, grain filling and seed quality. Flower shedding is very common in mungbean under heat stress, especially during spring/summer seasons. Late embryogenesis abundant (LEA) proteins help in adaptation to various abiotic stresses. However, it is not well studied elaborately in *Vigna* species. Therefore, we conducted the first comprehensive analysis of the LEA gene family in three legume species namely, mungbean (*Vigna radiata*), adzuki bean (*V. angularis*), and cowpea (*V. unguiculata*). The study identified 201 LEA genes harbouring the LEA conserved motif from these three *Vigna* crops. Among them, 55 *VrLEA*, 64 *VaLEA*, and 82 *VuLEA* genes were identified in mungbean, adzuki bean, and cowpea genomes, respectively. The *VrLEA-2* transcript significantly increased in Heat Susceptible (HS) genotype IPM 312-19, and decreased in Heat Tolerant genotype (HT), IC251372, under different levels of heat stress. The expression of *VrLEA-4* decreased in HS genotype after the heat shock induction, whereas non-significant increase in HT genotype was observed at 3 hours of heat shock, which significantly increased to about 2.5-fold in the 6 hours of heat stress treatment. The *VrLEA-5* gene was down-regulated in the 3 hours treatment in the HS genotype, whereas up-regulated by about 1.8-fold in the HT genotype. The expression of this transcript in 6 hr heat shock was up-regulated in both HS and HT genotypes, but the expression level was high in the HT than the HS genotype. The *Vr-SMP* transcript was down-regulated in the HS genotype after the heat shock, whereas it was up-regulated significantly to about 2-fold in HT genotype after the heat shock induction. This analysis of LEA genes provide an insight into their structural and functional diversity in *Vigna* genome and increases our understanding of LEA genes and provides candidate genes for future functional investigations and basis for improving heat stress tolerance in *Vigna* crops (Singh et al., 2022).

Australian mungbean breeding program collaborates with the University of Southern Queensland for mungbean disease research

Contributed by: Merrill Ryan, DAF, Australia

Dr. Merrill Ryan has recently joined the breeding team after Col Douglas left. Dr. Ryan will be part of new joint project initiatives between Department of Agriculture and Fisheries, Queensland (DAF) and the University of Southern Queensland (USQ).

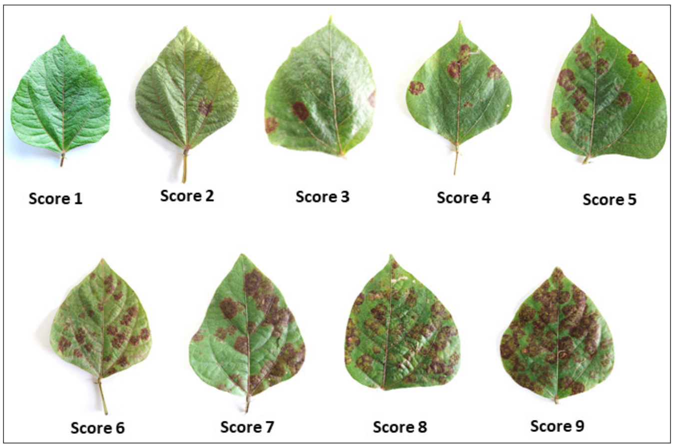
Currently, the Australian mungbean research team has four projects, covering root lesion nematode, tan spot, halo blight and powdery mildew. The tan spot and halo blight projects are to look at the pathogen and better understand pathogenicity, diversity, and aggressiveness. Evolution of the pathogen is critical as mungbean germplasm, once touted resistant, seems to no longer protect against these pathogens. Both these projects hope to make progress toward the development of qPCR for both tan spot and halo blight. Merrill hopes to connect with the bean breeding program in the USA to understand screening protocols for similar bacterial diseases. The powdery mildew project will look at plant resistance and will conduct Genome-Wide Association Mapping (GWAM) with DARTSeq SNP markers. The nematode project will focus on the Nested Association Mapping (NAM) collection and screen for *P. thorneii* tolerance in pot trials and conduct GWAM.

Bubble house in Warwick to be used for disease screening.

Identification of anthracnose resistance sources in mungbean mini-core collection

Contributed by: Abhishek Gowda, WorldVeg, India

Mungbean anthracnose is a common fungal disease in Asia and Sub-Saharan African countries. Multiple species of the Genus *Colletotrichum* cause mungbean anthracnose. The pathogen is a seed- and soil-borne, and its severity is determined by the weather. The disease causes yield reduction in mungbean, ranging from 30 to 70% in India. The symptoms of anthracnose on foliage appear as a brick red to dark brown lesion. Infection of pods causes direct damage to seeds, reducing their germination capacity and potentially resulting in yield loss. To identify the source of resistance, 42 mungbean mini-core accessions were screened for anthracnose resistance at the WorldVeg South Asia, Hyderabad during *Kharif*, 2021. Natural infection was observed in the field, and the scoring was done on a 1-9 visual rating scale (1= Immune and 9 = highly susceptible). The mini-core accessions such as VI003534 BG, VI003720 BG, VI004743 AG, VI003493 BG, VI003235 AG, VI002529 B-BL, VI003699 B-BG, VI004045 A-DGM, VI001652 BG, VI003337 BR, VI001244 AG,



Representative photos of different sores for anthracnose screening.

VI003534 BG (HR)

VI003720 BG (HR)

VI000212 A-BLM (HS)

Mungbean mini-core accessions showing a highly resistant (HR) and susceptible (HS) reaction against anthracnose disease in field.

VI003517 BG, VI003760 BG showed a high level of resistance reaction to anthracnose with the disease score of <3. Host-plant resistance is a low-cost and eco-friendly disease management strategy. As a result, the identified resistant accessions could be used in breeding programs as donors to develop anthracnose-resistant varieties.

Understanding flowering behaviour for the development of synchronous maturing mungbean

Contributed by: Shanice Van Haeften, Lee Hickey and Millicent Smith, DAF, Australia

The long flowering window of mungbean is an adaptive trait that can provide the crop a degree of yield plasticity. However, this behaviour results in staggered maturity, which can lead to complications in both mechanical and hand harvesting systems. Understanding the underlying mechanisms and control of flowering is the first step toward optimizing the flowering window in mungbean. In 2021, a PhD project undertaken by Shanice Van Haeften at the University of Queensland, Australia was initiated with the aim of understanding the genetic controls and value of phenology and plant architectural traits to assist the development of high yielding mungbean cultivars with synchronous flowering suited for Australia and Myanmar.

Over the upcoming Australian mungbean season, intensive efforts will be undertaken to gain a deeper understanding of flowering behaviour of mungbean across trials being conducted at two locations in Queensland, Australia. These trials will utilize a diverse mungbean breeding population jointly developed by the Department of Agriculture and Fisheries and the Queensland University of Technology. The results from these trials will dissect the physiology and genetics to identify traits that can be utilized in breeding programs to develop future mungbean varieties with synchronous maturity.

Example of indeterminate flowering behaviour seen in mungbean.

Pre-cooked mungbean product (Ready-to-eat *Ndengu*) promises to reduce harvest losses in Kenya

Contributed by: Rael Karimi, KALRO, Kenya

Mungbean predominantly supplies the dietary protein requirement for the vulnerable rural communities, who largely rely on starch-based diets. Economically, it is a major agro-enterprise in Semi-Arid Kenya, ranking second after indigenous chicken. Currently, the rapid expansion of urban populations, rising incomes, and the high cost of energy have fuelled the demand for fast-cooking processed foods. While canned and frozen legumes are available, they are often out of reach for most households because of their high cost and/or the requirement for refrigeration. Developing affordable, convenient, on-the-shelf mungbean products that require less time, fuel, and water to cook will enhance mungbean consumption and would likely help in improving income opportunities for mungbean producers.

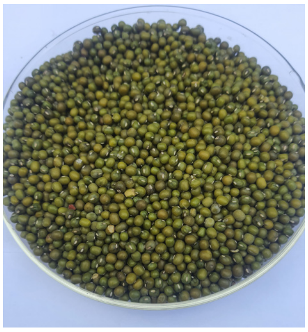
NatureLock, a food processing company, has developed a ready-to-eat mungbean product in Nairobi, Kenya. The unique drying technology helps in preserving food, adding natural ingredients that encapsulate the taste, also most vitamins and other nutrients. The product has an ambient shelf life of up to two years and is rich in essential nutrients with natural taste. Instead of boiling mungbean for hours, consumers simply add boiling water, stir, wait for three minutes, and it is ready. The new product promises to become an instant hit for people looking for a convenient, healthy and affordable meal.

NatureLock has ambitions to provide better markets to the mungbean produce through purchasing the produce that farmers cannot sell. Thus, Kenya Agriculture And Livestock Research Organization, Nairobi, Kenya (KALRO) in collaboration with NatureLock would encourage farmers to grow this crop and improve their livelihoods. Five commercial mungbean varieties *i.e., KAT N26, KS 20, Biashara, Karembo*, and *Ndengu* tosha were screened, of which *Ndengu tosha* was selected for production and industrial precooking.

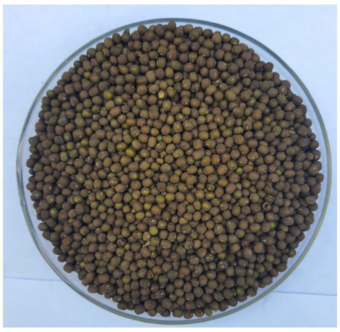
New Mungbeans for Tanzania

Contributed by: Papias H. Binagwa, TARI, Tanzania

The collaborative research between the World Vegetable Center and Tanzania Agricultural Research Institute (TARI) for improving mungbean productivity in Tanzania has finally culminated in the release of new mungbean varieties named TARI VEG GRAM-1 (AVMU 1601) and TARI VEG GRAM-2 (AVMU 1693). The research was supported by the Australian Centre for International Agricultural Research (ACIAR) through the International Mungbean Improvement Network and by the UK Government's Foreign, Commonwealth & Development Office (FCDO). The Tanzania Official Seed Certification (TOSCI) which is the government Institute under the Ministry of Agriculture established under the Seeds Act No. 18, 2003, is responsible for certification and promotion of quality agricultural seeds produced and imported into the country for sale to safeguarding farming community from poor seeds from vendors of farm inputs. In December 2021, TOSCI through its National Performance Trial (NPT) – Technical committee recommended the above two varieties to the National Variety Release Committee (NVRC) for official release. These varieties are attributed with higher productivity (>0.8t/ha), short maturity and disease resistance compared to the existing varieties.



AVMU 1601



AVMU 1693

Recipe- Mung Rolls

Contributed by: Aditya Pratap, ICAR-IIPR, India

Ingredients:

Mung dhal (split and dehusked)	: 200 gm.
Fresh curd	: 4 Tea spoon
Green chilli	: 2-3
Gram Flour	: 2 Tea spoon
Asafoetida (Optional)	: a pinch
Coriander leaves (chopped)	: 2 leaves
Lemon Juice	: 1 Tea spoon
Sugar	: a pinch
Salt	: as per taste

Method:

1. Soak mung dhal in sufficient water for about 2 hours.
2. Drain water and grind the dal in a mixer/ grinder with curd and green chillies.
3. Add gram flour and asafoetida to the mung dhal paste.
4. Heat a non-stick fry pan and grease banana leaves with edible oil. Spread the mixture. on the banana leaf and cover it with another leaf; Make a roll.
5. Cook on both the sides on low flame for 5-10 minutes.

Serve delicious hot rolls with green coriander sauce/Chutney.

Staff features

Dr Merrill Ryan, DAF

Dr. Merrill Ryan, a Principal Scientist, joined DAF at Warwick, Queensland 24 years ago to develop a molecular marker laboratory for the National Barley Molecular Marker Program. Merrill completed her Honours degree in Plant Breeding at The University of Queensland and her PhD in wheat cytogenetics and pathology at The University of Sydney in 2000. In 2003, she entered the pulse breeding space and has bred and co-bred 13 mungbean and chickpea varieties. These Queensland adapted cultivars are sought after in global export markets for their superior grain quality attributes. She presently leads the National Mungbean Improvement Program funded by Department of Agriculture and Fisheries (DAF) and Grain Research and Development Corporation (GRDC). Merrill is also involved in a global ACIAR funded initiative, the International Mungbean Improvement Network, partnering with several countries to share genetic and genomic resources, and knowledge.

Shanice Van Haeften

Shanice Van Haeften joined the International Mungbean Improvement Network in 2021 when she began her PhD at The University of Queensland. Her project aims to develop a deeper understanding of the genetic controls and value of phenology and plant architectural traits of a diverse mungbean population using new breeding technologies. Shanice aims to explore key physiological traits that can be combined through targeted breeding to develop high yielding mungbean cultivars suited for Australia and Myanmar. Prior to beginning her PhD, Shanice was a technician supporting pollen research at QUT. She completed a Bachelor of Science and Bachelor of Business with Honours Class I at the Queensland University of Technology, Australia.

List of Publications

1. Aidbhavi R, Pratap A, Verma P, Lamichaney A, Bandi SM, Nitesh SD, Akram M, Rathore M, Singh B and Singh NP. 2021. Screening of endemic wild *Vigna* accessions for resistance to three bruchid species. *Journal of Stored Products Research*, 93, p.101864. 93:101864. doi.org/10.1016/j.jspr.2021.101864

2. Akram M, Kamaal N, Pratap A and Singh NP. 2021. Resistance status of mungbean (*Vigna radiata* (L.) Wilczek) advanced breeding materials against Mungbean Yellow Mosaic India Virus. *Archives of Phytopathology and Plant Protection*, 54(19-20), pp.2533-2546. doi.org/10.1080/03235408.2021.2002656

3. Gore PG, Gupta V, Singh R, Tripathi K, Kumar R, Kumari G, Bhat KV, Nair RM, Pratap A. 2022. Insights into the genetic diversity of an underutilized Indian legume, *Vigna stipulacea* (Lam.) Kuntz., using morphological traits and microsatellite markers. *PLoS ONE*, 17(1), p.e0262634. doi.org/10.1371/journal.pone.0262634

4. Gore PG, Das A, Bhardwaj R, Tripathi K, Pratap A, Dikshit HK, Bhattacharya S, Nair RM and Gupta V. 2021. Understanding G× E interaction for nutritional and antinutritional factors in a diverse panel of *Vigna stipulacea* (Lam.) Kuntz germplasm tested over the locations. *Frontiers in plant science*, 12, pp.766645-766645. doi: 10.3389/fpls.2021.766645

5. Kumari G, Roopa LG, Shanmugavadivel PS, Singh Y, Singh P, Patidar B, Madhavan L, Gupta S, Singh NP and Pratap A. 2021. Genetic diversity and population genetic structure analysis of an extensive collection of wild and cultivated *Vigna* accessions. *Molecular Genetics and Genomics*, 296(6), pp.1337-1353. doi: 10.1007/s00438-021-01825-7

6. Reddy VRP, Dikshit HK, Mishra GP, Aski M, Singh A, Bansal R, Pandey R and Nair RM. 2021. Comparison of different selection traits for identification of phosphorus use efficient lines in mungbean. *PeerJ*, 9, p.e12156. doi.org/10.7717/peerj.12156

7. Rohilla V, Yadav R, Poonia A, Sheoran R, Kumari G, Shanmugavadivel PS and Pratap, A. 2022. Association mapping for yield attributing traits and yellow mosaic disease resistance in Mungbean [*Vigna radiata* (L.) Wilczek]. *Frontiers in Plant Science*, 12: 749439. doi: 10.3389/fpls.2021.749439

8. Sharma M, Tarafdar A, Pandey A, Ahmed S, Pandey V, Chobe DR, Ghosh R, Nair RM, Pandey S, Reddy M and Maalouf F. 2021. Biotic stresses in food legumes: An update and future prospects. In Genetic Enhancement in Major Food Legumes (pp. 149-196). Springer, Cham. doi.org/ 10.1007/978-3-030-64500-7_6

9. Singh CM, Prajapati U, Gupt S, and Pratap A. 2021. Microsatellite-based association mapping for agronomic traits in mungbean (*Vigna radiata* L. Wilczek). *Journal of genetics*, 100(2), pp.1-12. doi.org/10.1007/s12041-021-01336-9

10. Singh CM, Kumar M, Pratap A, Tripathi A, Singh S, Mishra A, Kumar H, Nair RM and Singh NP. 2022. Genome-wide analysis of late embryogenesis abundant protein gene family in *Vigna* species and expression of VrLEA encoding genes in *Vigna glabrescens* reveal its role in heat tolerance. *Frontiers in* Plant Science.p.396.doi: 10.3389/fpls.2022.843107

11. Tripathi K, Pamarthi RK, Gore PG, Nagaraju S, Madhavan L, Gayacharan C, Singh N, Ahlawat SP, Rana JC, Pratap A and Kumar A. 2022. Identification and development of key descriptors for phenotypic characterization of tuber cowpea [*Vigna vexillata* (L.) A. Rich.]. *Genetic Resources and Crop Evolution*, pp.1-15. doi.org/10.1007/s10722-021-01328-9

Project News & Events

Brainstorm meeting: The ICAR-Indian Institute of Pulses Research, Kanpur and the Indian Society of Pulses Research and Development jointly organized a brainstorming meeting on "Sustaining growth in pulses" on Feb. 10, 2022 on the Occasion of World Pulses Day.

External review meeting: The external review of the ACIAR funded project entitled 'International Mungbean Improvement Network Phase 1' was held virtually from 29-30 November 2021. All the collaborative partners along with the WorldVeg team presented the work done in IMIN 1 which was well appreciated by the reviewers. The IMIN 1 was concluded on 31st December 2021. The work plan of the second phase of the project (IMIN2: 2021-2025) was also discussed with the reviewers on 1st December 2021.

Review Meeting: The external review of the ACIAR funded project entitled "Improved mungbean harvesting and seed production systems for Bangladesh, Myanmar, and Pakistan were completed virtually during 6-7 December 2021. All the collaborative NARS partners from target countries, along with the WorldVeg team, presented the work done in the project. The final report of the project was published and is available at [Final Report 2016]

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