



Notification and germplasm registration

Rice

Variety Swarna Sukha Dhan

The variety, Swarna Sukha Dhan (IET 24692) has been developed by the ICAR Research Complex for Eastern Region, Patna in collaboration with International Rice Research Institute (IRRI), Philippines under ICAR-IRRI collaborative project. It has been released by the State Seed Sub-Committee (Uttar Pradesh) on 23.06.2021 and notified by the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops, Govt. of India vide notification number S.O. 8 (E) dated 24th December 2021 for the state of Uttar Pradesh. It is a high yielding multiple stress tolerant rice variety suitable for cultivation under direct seeded condition in drought prone rainfed midland to upland ecosystem. The breeding objective was to develop a variety which is suitable for direct seeded condition with in-built tolerance to major diseases and insect pests with good grain quality. The elite breeding line RCPR-16-IR84894-143-CRA-17-1 (IET 24692) was selected from the segregating materials of the cross, IR 77080-B-34-3/IRRI 132. This promising line was entered in the State Varietal Trial (SVT), Uttar Pradesh in 2017 (under rainfed condition). Based on three years (2017-2019) of testing under SVT (U.P) trial, Based on three years (2017-2019) of testing under SVT (U.P) trial, IET 24692 recorded an overall mean grain yield of 1915 kg/ha and showed superiority with yield advantage of 11.48 and 19.63% over NDR 97 (best check) and Shusk Samrat (local check), respectively. The elite breeding line RCPR-16-IR84894-143-CRA-17-1 was entered in national

AICRIP programme for multi-location testing in 2014 as IET 24692 under rainfed upland trial. Under national AICRIP programme, based on three years (2014-2016) of testing under early direct seeded trial (normal condition), RCPR-16 (IET 24692) has recorded an overall mean grain yield 3582 kg/ha and showed yield gain of 18.6%, 29.0% and 24.0% over best national check (Sahbhagi Dhan), regional, and local checks, respectively. In addition, under drought condition in AICRIP trial, IET 24692 had recorded mean grain yield of 2833 kg/ha and showed yield advantage of 17.6%, 23.6% and 42.7 % over national check (Sahbhagi Dhan), regional and local check varieties, respectively.

Swarna Sukha Dhan is an early duration (110-115 days), semi-dwarf, high yielding (3.5-4.0 t ha⁻¹), multiple stresses (drought, disease and insect pest) tolerant, with desirable cooking quality traits and high Zinc (23.1 ppm) content. Quality wise, Swarna Sukha Dhan possesses 78.4% hulling, 70.9% milling, 68.4 % head rice recovery (HRR) with desirable intermediate alkali spreading value (ASV=4.0) and amylose content (22.3%). It has soft GC content (49 mm) with very occasionally chalky and medium slender grains indicating that good cooking quality. It is resilient to changes in rainfall distribution. Swarna Sukha Dhan is moderately resistant to false smut, leaf blast, bacterial leaf blight, brown spot, sheath blight and RTD diseases. This is also tolerant to major insect pests like stem borer, leaf folder, Brown Plant Hopper (BPH), BPH and whorl maggot. This variety may be good replacement of existing rice varieties in drought prone rainfed medium to upland ecosystem of Uttar Pradesh.

Santosh Kumar*, J.S. Mishra, S.S. Singh¹, A. K. Dubey, S.K. Dwivedi, N. Bhakta, Md. Monobrullah, Rakesh Kumar, B.P. Bhatt, O. N. Singh², V. P. Bhadana³ and Arvind Kumar⁴

ICAR Research Complex for Eastern Region, Patna 800 014, Bihar; ¹Rani Lakshmi Bai Central Agricultural University, Jhansi 284 003, Uttar Pradesh; ²ICAR-National Rice Research Institute, Cuttack 753 006, Odisha; ³ICAR-Indian Institute of Agricultural Biotechnology, Ranchi 834 010, Jharkhand; ⁴International Rice Research Institute South Asia Regional Centre (ISARC), Varanasi 221 106, U.P

*Corresponding author's e-mail: santosh9239@gmail.com



Variety Swarna Unnat Dhan

A highly promising elite line RCPR 58-IR 93827-29-1-1-3 (IET 27892) was selected from the segregating materials of cross IR 81039-B-173-U-3-3/IR 81063-B-94-U-3-1. The selection was made by the breeders at the ICAR Research Complex for Eastern Region, Patna. The work was done in collaboration

with International Rice Research Institute (IRRI), Philippines under ICAR-IRRI collaborative project "STRASA". The line was named as Swarna Unnat Dhan (IET 27892) which has been released and notified by the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops, Govt. of India vide notification number

S.O. 8 (E) dated 24th December 2021 for the cultivation under irrigated transplanted condition in the states of Bihar, Odisha, West Bengal, Madhya Pradesh and Maharashtra. Swarna Unnat Dhan has developed with objectives to breed a high yielding, drought tolerance, semi-dwarf, early maturity duration rice variety suitable for irrigated transplanted condition with in-built tolerance to major diseases and insect pests with good grain quality. Rice variety Swarna Unnat Dhan was entered as IET 27892 in national AICRIP coordinated irrigated early duration transplanted trials in 2018 and has consistently outperformed the national, regional and local check varieties in zone III and Zone V during 2018-2020. Based on three years of national testing in AICRIP trial under irrigated transplanted condition (early duration), IET 27892 recorded an overall mean grain yield of 5303 kg/ha, and showed a yield gain of 13.76%, 35.22% and 15.06% over the national (CO-51), zonal and local checks, respectively. Moreover, based on three years of testing IET 27892 has recorded an overall mean grain yield of 5551 kg/ha and 4725 kg/ha in Zone III and Zone V, respectively. Furthermore, based on three years of testing rice variety

Swarna Unnat Dhan has recorded an overall mean grain yield of 5224, 6203, 5074, 4675 and 5535 kg/ha in Bihar, Odisha, West Bengal, Madhya Pradesh and Maharashtra, respectively.

Swarna Unnat Dhan is a early duration (115-120 days), semi-dwarf (100-105 cm), high yielding (5.0-5.5 t ha⁻¹), multiple stresses (drought, disease and insect pest) tolerant, lodging resistant with desirable cooking quality traits and having long slender grain type. Quality wise, Swarna Unnat Dhan possesses 77.7% hulling, 67.4% milling, 63.2 % head rice recovery (HRR) with desirable intermediate alkali spreading value and amylose content (24.34%). It has soft GC content (43.5 mm) with very occasionally chalky and long slender grains indicating that good cooking quality. It is resilient to changes in rainfall distribution. Swarna Unnat Dhan is moderately resistant to bacterial leaf blight, leaf blast, sheath rot, brown spot and, false smut diseases. This is also tolerant to major insect pests like stem borer, BPH and gall midge. This variety may be good replacement of existing rice varieties in irrigated as well as water scarcity areas of Zone III and V.

Santosh Kumar*, **A. K. Choudhary**, **J. S. Mishra**, **A. K. Dubey**, **Jyothi Badri¹**, **N. Bhakta¹**, **Md. Monobrullah**, **Ujjwal Kumar**, **S. P. Singh²**, **O. N. Singh³** and **Arvind Kumar⁴**

ICAR Research Complex for Eastern Region, Patna-800 014, Bihar; ¹Division of Crop Improvement, ICAR-Indian Institute of Rice Research, Hyderabad 500 030; ²Bihar Agricultural University, Sabour, Bhagalpur 813 210, Bihar; ³Birsa Agricultural University, Ranchi 834 006, Jharkhand; ⁴International Rice Research Institute South Asia Regional Centre (ISARC), Varanasi 221 106, U.P
*Corresponding author's e-mail: santosh9239@gmail.com



Variety Swarna Samriddhi Dhan

A high yielding multiple stress tolerant rice variety, Swarna Samriddhi Dhan (IET 24306) has been developed by the ICAR Research Complex for Eastern Region, Patna in collaboration with International Rice Research Institute (IRRI), Philippines under ICAR-IRRI collaborative project "STRASA". It has been released by State seed Sub Committee (Bihar) on 20.01.2020 and notified by the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops, Govt. of India vide notification number S.O. 500 (E) dated 29th January 2021), for the state of Bihar. It is suitable for cultivation under transplanted condition in irrigated as well as rainfed shallow lowland ecology of Bihar. Swarna Samriddhi Dhan was developed with objectives to breed a high yielding, semi-dwarf, medium maturity duration rice variety suitable for transplanted condition in irrigated and rainfed shallow lowland areas with in-built tolerance to abiotic stresses and resistance to major diseases and insect pests with good grain quality. The elite breeding line RCPR 10-IR83383-B-B-129-4 (IET 24306) was developed from the segregating materials of the cross, IR72022-46-2-3-3-2 / IR57514-PMI 5-B-1-2. Rice variety Swarna Samriddhi Dhan was entered as IET 24306 in national AICRIP

coordinated irrigated medium duration trials in 2014 and has consistently outperformed the national, regional and local check varieties in zone III during 2014-2016. Based on three years national testing in Zone III under irrigated medium duration AICRIP trial, Swarna Samriddhi Dhan has recorded an overall mean grain yield of 5729 kg/ha and showed yield gain of 17.39, 6.91 and 10.03% over national (NDR 359), regional and local checks, respectively. In addition, during three year (2014-2016) testing in the state of Bihar, IET 24306 has recorded overall mean grain yield 6243 kg/ha and showed yield gain of 33.7, 12.7 and 35.2% over national, regional and local checks, respectively. Furthermore, based on two years adaptive trial conducted in different locations of Bihar, Swarna Samriddhi Dhan recorded mean grain yield 5262 kg/ha and showed yield advantage of 12.60% over check variety Rajendra Sweta.

Swarna Samriddhi Dhan is a medium duration (135-140 days), semi-dwarf (105-110 cm), high yielding (5.5-6.0 t ha⁻¹), multiple stresses (drought, submergence, disease and insect pest) tolerant, lodging resistant with desirable cooking quality traits and having long slender grain type. Quality wise, Swarna Samriddhi Dhan possesses 77.8% hulling, 62.0% milling, 55.6 % head rice recovery (HRR) with

desirable intermediate alkali spreading value and amylose content (24.33%). It has soft GC content (41.5 mm) with very occasionally chalky and long slender grains indicating that good cooking quality. It is resilient to changes in rainfall distribution. Beside drought tolerant, this variety can also tolerate 08-10 days submergence. Swarna Samriddhi Dhan

is moderately resistant to leaf blast, brown spot, false smut, sheath blight, RTD and glume discoloration. This is also tolerant to major insect pests like stem borer, gall midge, and leaf folder. This variety may be good replacement of existing rice varieties in irrigated and rainfed shallow lowland ecology of Bihar.

Santosh Kumar*, J. S. Mishra¹, S. K. Dwivedi, N. Bhakta, A. K. Dubey, Md. Monobrullah, B. P. Bhatt, Mandhata Singh¹, S. P. Singh², S. K. Singh³, Nityanad⁴ and Arvind Kumar⁵

ICAR Research Complex for Eastern Region, Patna 800 014, Bihar; ¹Krishi Vigyan Kendra, Buxar 802 103, Bihar; ²Bihar Agricultural Universities, Sabour, Bhagalpur 813 210, Bihar; ³Krishi Vigyan Kendra, Jamui 811 313, Bihar; ⁴Krishi Vigyan Kendra, Aurangabad 824 112, Bihar; ⁵International Rice Research Institute South Asia Regional Centre (ISARC), Varanasi 221 106, U.P.

*Corresponding author's e-mail: santosh9239@gmail.com



Bread wheat

Variety DBW 327 (Karan Shivani)

A promising genotype, DBW327 was selected by the breeders at the ICAR-Indian Institute of Wheat & Barley Research, Karnal from the advance lines received from CIMMYT. This genotype is derived from the cross, NELOKI//SOKOLL/EXCALIBUR. This high yielding bread wheat variety DBW 327 (Karan Shivani) was released and notified by the Central Sub-Committee on Crop Standard Notification and Release of Varieties for Agricultural Crops Govt. of India vide notification number S.O.8 (E), dated 24th of December, 2021 for commercial cultivation. It is recommended for early sown (October 20 to November 5), high input (150% of recommended NPK) along with two sprays of growth retardants (Chlormequat chloride @ 0.2%+ tebuconazole @ 0.1% of commercial product dose at first node and flag leaf stage) under irrigated conditions in North Western Plains Zone comprising of Punjab, Haryana, Delhi, Rajasthan (except Kota & Udaipur divisions) and Western UP (except Jhansi division), parts of J&K (Jammu & Kathua Distt.) and parts of Himachal Pradesh (Una Distt. and Paonta valley) and Uttarakhand (Tarai region).

DBW 327 was tested under coordinated trials of All India Coordinated Research Project on Wheat and Barley in Special High Yield Potential Yield Trial for two years during 2019-2020 and 2020-2021 at 13 locations along with checks. The entry DBW327 significantly out yielded the check varieties, HD 2967 (35.3%) and HD3086 (13.6%) and also out yielded the identified checks, DBW187 (4.6%),

DBW303 (4.4%) and WH1270 (6.4%). The average yield of DBW 327 is 79.4q/ha with a potential yield of 87.7q/ha. In agronomic trials, DBW327 was found highest yielding both under 150%RDF+FYM +GR (72.02q/ha) and recommended dose of fertilizer (63.70q/ha). DBW 327 is highly resistant for stripe and leaf rust under natural and artificial conditions as evident from the lower ACI values. It has also displayed resistance against the predominant races of stripe rust viz., 110S119, 238S119 and 46S119 at adult plant stage. The variety has shown better resistance against Karnal bunt as compared to checks. Based on physiological parameters, the variety has shown high tolerance to heat and drought as evident from lower heat and drought susceptible indices (HIS, 0.81 and DSI, 0.78). DBW 327 has good grain appearance (6.4), along with high hectoliter weight (81.0). It possesses better chapatti quality score (7.67) and has high grain Fe (39.4ppm) and Zn (40.6ppm) contents.

Karan Shivani (DBW327) a spring wheat variety with semi erect habit, flowers in around 98 days and matures in 155 days and hence, falls under medium maturity group. The variety has green foliage and waxy attribute (strong) at the time of ear emergence. The ears are tapering and white in colour with intermediate density having medium awn length. The peduncle is bent in shape. The non-pubescent glumes are having straight shoulder shape with short beak length. Amber coloured grains having oblong shape tend to have hard texture and are bold in size (48g). The grains are having round crease with wide germ width. The brush hair is shorter in length with weak profile.

Chandra Nath Mishra*, Hanif Khan, Satish Kumar, Amit Kumar Sharma, Krishnappa Gopalareddy, Om Parkash, Poonam Jasrotia, Harohalli Masthigowda Mamrutha, Arun Gupta, Vikas Gupta, Charan Singh, Bhudeva Singh Tyagi, Santosh Kumar Bishnoi, Subash Chander Bhardwaj, Pramod Prasad, Sudheer Kumar, Umesh Ravindra Kamble, Madan Lal, Rajesh Kumar, Gyanendra Singh and Gyanendra Pratap Singh

ICAR-Indian Institute of Wheat and Barley Research, Karnal, India

* Corresponding authors' email: Chandra.Mishra@icar



Variety DBW 332 (Karan Aditya)

A highly promising genotype named as DBW332 was selected by the breeders at ICAR-Indian Institute of Wheat & Barley Research, Karnal from the advance lines received from CIMMYT. It is derived from the cross, MUTUS/ROLF07//MUCUY. The variety DBW 332 (Karan Aditya) has been released and notified by the Central Sub-Committee on Crop Standard Notification and Release of Varieties for Agricultural Crops Govt. of India notification in the official gazette number S.O.8 (E), dated 24th of December, 2021 for general cultivation. It is recommended for early sown (October 20 to November 5), high input (150% of recommended NPK) along with two sprays of growth retardants (Chlormequat chloride @ 0.2%+ tebuconazole @ 0.1% of commercial product dose at First Node and Flag leaf stage) under irrigated conditions in North Western Plains Zone comprising of Punjab, Haryana, Delhi, Rajasthan (except Kota & Udaipur divisions) and Western UP (except Jhansi division), parts of J&K (Jammu & Kathua Distt.) and parts of Himachal Pradesh (Una Distt. and Paonta valley) and Uttarakhand (Tarai region).

The entry DBW332 was tested under coordinated trials of All Indian Coordinated Research Project on Wheat and Barley in Special High Yield Potential Yield Trial for two years 2019-20 and 2020-21 at thirteen locations along with checks. DBW 332 significantly outperformed the check varieties HD 2967 (31.3%) and HD3086 (12.0%) and also out yielded the identified checks DBW187 (3.2%), DBW303

(3.0%) and WH1270 (5.0%). The average yield of DBW 332 is 78.3q/ha with a potential yield of 83.0q/ha. In agronomic trials, DBW327 was high yielding in agronomical trials both under 150%RDF+FYM +GR (70.01q/ha) and recommended dose of fertilizer (63.56q/ha). DBW 332 is highly resistant for stripe and leaf rust under natural and artificial conditions as evident from the lower ACI values. Under APR studies, conducted for predominant race of stripe rust viz., 110S119, 238S119 and 46S119 it has shown high resistant at adult plant stage. The proposed entry is also resistant for 77-5, 77-9 and 104-2 races of leaf rust. The proposed variety DBW332 carries Yr A+ gene for stripe rust resistant which is different from genes present in all the checks and identified varieties. DBW 332 has high protein (12.2%), high hectoliter weight (78.9), better chapati quality score (7.64), high bread loaf volume (575), high gluten index (82%) and high grain Fe (39.2ppm)

Karan Aditya (DBW332), a spring wheat variety with erect growth habit, flowers in around 101 days with medium maturity of about 156 days. It has dark green foliage and waxy attributes (very strong) at the time of ear emergence. The ears are tapering and white in colour with medium density having medium length awns which are white in colour. The peduncle is bent in shape. The non-pubescent glumes are having sloping shoulder shape with short beak length. Amber coloured grains having oblong shape tend to have hard texture and are bold in size (46g). The grains are having round crease with medium germ width. The brush hair is shorter in length with weak profile.

Chandra Nath Mishra*, Hanif Khan, Satish Kumar, Amit Kumar Sharma, Krishnappa Gopalarreddy, Om Parkash, Poonam Jasrotia, Harohalli Masthigowda Mamrutha, Arun Gupta, Vikas Gupta, Charan Singh, Bhudeva Singh Tyagi, Santosh Kumar Bishnoi, Subash Chander Bhardwaj, Pramod Prasad, Sudheer Kumar, Umesh Ravindra Kamble, Madan Lal, Rajesh Kumar, Gyanendra Singh and Gyanendra Pratap Singh

ICAR- Indian Institute of Wheat and Barley Research, Karnal, India

*Corresponding author's e-mail: Chandra.Mishra@icar.gov.in



Maize

Pusa HQPM-5 Improved

Pusa HQPM-5 Improved (IC 631903) is a provitamin-A rich quality protein maize (QPM) hybrid developed through marker-assisted introgression of β -carotene hydroxylase (*crtrB1*), lycopene epsilon cyclase (*lcyE*) and *opaque2* (*o2*) genes at ICAR-Indian Agricultural Research Institute, New Delhi. It is the country's first provitaminA rich maize hybrid released and notified for commercial cultivation across the country. It possesses 6.77 ppm of provitamin A with an enhancement of 564% (1.02 ppm in HQPM5). It also possesses high lysine (4.25%) and tryptophan (0.94%) in endosperm protein compared to traditional maize (0.3-0.4% tryptophan and 1.5-2.0% lysine), and thus is a multi-nutrient maize hybrid. It is an essentially derived

variety of popular single cross QPM hybrid, HQPM5 earlier developed at CCS-Haryana Agricultural University, Regional Station, Uchani, Karnal. The parental lines of HK1163 and HK1161 were introgressed with mutant *crtrB1* and *lcyE* gene from CIMMYT-HarvestPlus developed donor lines viz., HP704-22 and HP704-23, respectively. Functional InDel marker for *crtrB1* and *lcyE* and *o2*-gene based SSR marker, phi057 were utilized for foreground selection. The introgressed female parent (PMI-PV6) possesses 91.3% of recurrent parent genome (RPG) while the male parent (PMI-PV5) has 92.5% of RPG. Pusa HQPM-5 Improved possesses similar morphological characteristics of HQPM5 due to high recovery of RPG. It was tested for two years (AVT-I & AVT-II) under QPM trial of All India Coordinated Research Project on Maize (AICRP-Maize). Based on its performance, it was identified by the variety identification committee at the

62nd Annual Maize Workshop, AICRP-Maize held at AAU, Jorhat on 05.04.2019. It has been released and notified for cultivation during *kharif* season across the India vide gazette notification no. S.O. 99(E) dated 6th January, 2020. In Northern Hill Zone [NHZ: Jammu and Kashmir, Himachal Pradesh, Uttarakhand (Hill region), North Eastern Hill Region (Meghalaya, Sikkim, Assam, Tripura, Nagaland, Manipur, Arunachal Pradesh)], the average grain yield of Pusa HQPM-5 Improved was 7263 kg/ha, while in North Western Plain Zone [NWPZ: Punjab, Haryana, Delhi, Uttarakhand, (Plain),

Uttar Pradesh (Western region)], North Eastern Plain Zone [NEPZ: Bihar, Jharkhand, Odisha, Uttar Pradesh, (Eastern region), West Bengal], Peninsular Zone (PZ: Maharashtra, Karnataka, Andhra Pradesh, Telangana, Tamil Nadu) and Central Western Zone (CWZ: Gujarat, Madhya Pradesh, Chhattisgarh, Rajasthan), it yielded 7510 kg/ha, 5345 kg/ha, 7123 kg/ha, 5120 kg/ha, respectively. Pusa HQPM-5 Improved with high provitamin A, lysine and tryptophan can potentially provide sustainable solution to alleviate micronutrient malnutrition.

F. Hossain*, V. Muthusamy, H. S. Gupta, R. U. Zunjare, J. S. Bhat, T. Nepolean, M. G. Mallikarjuna, G. Mukri, J. Kaul, R. N. Gadag, S. Saha, K. M. Manjaiah, S. Basu, Sunil K. Jha, R. Gogoi, V. Pooniya, C. M. Parihar, M. Kapasia, R. Kumar, D. Pal, B. G. Bhavi and M. Devidas

Contributors of original hybrid, HQPM5: S. Dass¹, K. S. Dhanju¹, D. Pal¹, J.C. Mehla¹, D.P. Singh¹ and M. C. Kamboj¹
ICAR-Indian Agricultural Research Institute, New Delhi 110 012; ¹Chaudhary Charan Singh-Haryana Agricultural University, Uchani, Karnal 132 001

*Corresponding author's e-mail: fh_gpb@yahoo.com



Pusa HQPM-7 Improved

Maize is the third most important crop of the India. It serves as source of food, feed, fodder and variety of industrial products. Maize biofortification is essentially required to ensure nutritional security of country. Pusa HQPM-7 Improved (IC 631906) is a provitamin-A rich quality protein maize (QPM) variety developed using molecular breeding for β -carotene hydroxylase (*crtRB1*), lycopene epsilon cyclase (*lcyE*) and *opaque2* (*o2*) genes at ICAR-Indian Agricultural Research Institute, New Delhi. It possesses 7.10 ppm of provitamin A with enhancement of 512% (1.16 ppm in HQPM7). It also possesses high lysine (4.19%) and tryptophan (0.93%) in endosperm protein compared to traditional maize (0.3-0.4% tryptophan and 1.5-2.0% lysine), and thus is a multi-nutrient maize hybrid. It is an essentially derived variety of popular single cross QPM hybrid, HQPM7 earlier developed at CCS-Haryana Agricultural University, Regional Station, Uchani, Karnal. The parental lines of HKI193-1 and HKI161 were introgressed with mutant *crtRB1* and *lcyE* genes from CIMMYT-HarvestPlus developed donor

line, HP704-23. Functional InDelmarker for *crtRB1* and *lcyE* and *o2*-gene based SSR marker, *phi057* were utilized for foreground selection. The introgressed female parent (PMI-PV7) possesses 92.1% of recurrent parent genome (RPG), while the male parent (PMI-PV5) has 92.5% of RPG. Pusa HQPM-7 Improved possesses similar morphological characteristics of HQPM7 due to high recovery of RPG. It was tested for two years (AVT-I & AVT-II) under QPM trial of All India Coordinated Research Project on Maize (AICRP-Maize). Based on its performance, it was identified by the variety identification committee at the 62nd Annual Maize Workshop - AICRP-Maize held at AAU, Jorhat on 05.04.2019. It has been released and notified for cultivation during *kharif* season in peninsular zone (PZ: Maharashtra, Karnataka, Andhra Pradesh, Telangana and Tamil Nadu) vide gazette notification no. S.O. 99 (E) dated 6th January, 2020. In PZ, the average grain yield of 'Pusa HQPM-7 Improved' was 7450 kg/ha. Pusa HQPM-7 Improved with high provitamin A, lysine and tryptophan can potentially provide sustainable solution to alleviate micronutrient malnutrition.

F. Hossain*, V. Muthusamy, H. S. Gupta, R. U. Zunjare, J. S. Bhat, T. Nepolean, M. G. Mallikarjuna, G. Mukri, J. Kaul, R. N. Gadag, S. Saha, S. K. Jha, K. M. Manjaiah, S. Basu, R. Gogoi, V. Pooniya, C. M. Parihar, M. Kapasia, R. Kumar, D. Pal, B. G. Bhavi and M. Devidas

Contributors of original hybrid, HQPM7: S. Dass¹, D. Pal¹, J.C. Mahla¹, K. S. Dhanju¹, D.P. Singh, Rishi Pal¹ and M.C. Kamboj¹
ICAR-Indian Agricultural Research Institute, New Delhi 110 012; ¹Chaudhary Charan Singh-Haryana Agricultural University, Uchani, Karnal 132 001

*Corresponding author's e-mail: fh_gpb@yahoo.com



Pusa Vivek Hybrid-27 Improved

Maize provitamin-A biofortification through marker-assisted selection (MAS) for β -carotene hydroxylase (*crtRB1*) gene is the promising strategy to rapidly convert normal maize hybrids into provitamin A rich version. At ICAR-Indian Agricultural Research Institute, New Delhi, provitamin-A rich maize hybrid, Pusa Vivek Hybrid-27 Improved (IC 631908) developed through MAS for *crtRB1* gene which possesses 5.49ppm of provitamin-A. It is an essentially derived variety of popular single cross hybrid, Vivek Hybrid 27 (provitamin-A: 0.95ppm) earlier developed at ICAR-Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora. The parental lines of V335 and V345 were introgressed with mutant *crtRB1* gene from CIMMYT-HarvestPlus developed donor lines viz., HP465-30 and HP465-35, respectively. Functional InDel marker for *crtRB1* was utilized for foreground selection. The introgressed female parent (PMI-PV3) possesses 94.8%

of recurrent parent genome (RPG), while the male parent (PMI-PV4) has 91.5% of RPG. Pusa Vivek Hybrid-27 Improved possesses similar morphological characteristics of Vivek Hybrid 27 due to high recovery of RPG. It was tested for two years (AVT-I & AVT-II) under QPM trial of All India Coordinated Research Project on Maize (AICRP-Maize). Based on its performance, it was identified by the variety identification committee at the 62nd Annual Maize Workshop - All India Coordinated Maize Improvement Project held at AAU, Jorhat on 05.04.2019. It has been released and notified for cultivation during *kharif* season in North Eastern Plains Zone [NEPZ: Bihar, Jharkhand, Odisha, Uttar Pradesh, (Eastern region) and West Bengal] vide gazette notification no. S.O. 99(E) dated 6th January, 2020. In NEPZ, the average grain yield of Pusa Vivek Hybrid-27 Improved was 4854 kg/ha. Pusa Vivek Hybrid-27 Improved with high provitamin-A can potentially provide sustainable solution to alleviate vitamin A deficiency.

F. Hossain*, H. S. Gupta, V. Muthusamy, R. U. Zunjare, J. S. Bhat, T. Nepolean, R. N. Gadag, B. M. Prasanna, S. Saha, S. Basu, Sunil. K. Jha, R. Gogoi, R. Kumar, M. Kapasia, D. K. Diwakar and M. Choudhary

Contributors of original hybrid, Vivek Hybrid 27: V. Mahajan¹, R. Babu¹, V. P. Mani¹, H. S. Gupta¹, K. S. Koranga¹, G. S. Bisht¹ and M. C. Pant¹

ICAR-Indian Agricultural Research Institute, New Delhi 110 012; ¹ICAR-Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora 263 601

*Corresponding author's e-mail: fh_gpb@yahoo.com



Pusa Super Sweet Corn 2

Sweet corn (*Zea mays* var. *saccharata* Strut.) is a specialty maize with high sugar content in its endosperm compared to starch rich endosperm of normal corn. It is used as vegetable globally and consumed in the both fresh and processed form. Considering its importance in country, new single cross sweet corn hybrid, Pusa Super Sweet Corn 2 (IC 631900) is developed using recessive *shrunken2* (*sh2*) gene by ICAR-Indian Agricultural Research Institute, New Delhi. The parental inbreds viz., PMI-SWT016 (IC 631901) and PMI-SWT017 (IC 631902) as female and male parent, respectively were developed by pedigree breeding approach. It provides excellent grain and ear quality for sweet corn purpose, and most suitable for irrigated conditions. It possesses significantly higher kernel sweetness with an average brix of 16.4%. Average green ear yield is 12.62 t/ha, while the

cob (dehusked) yield is 9.81t/ha. It is also promising for high volume of green fodder (average: 18.3 t/ha). Since, it matures in 76-78 days; multiple crops can be taken on a single field in a year. It was tested for three years (SC-I, SC-II & SC-III) under sweet corn trial of All India Coordinated Research Project on Maize (AICRP-Maize). Based on its superior performance, it was identified by the variety identification committee at the 62nd Annual Maize Workshop –AICRP-Maize held at AAU, Jorhat on 05.04.2019. It has been released and notified for cultivation during *kharif* season in states viz., Himachal Pradesh, Haryana, Uttarakhand, Uttar Pradesh, Tamil Nadu, Karnataka, Chhattisgarh and Rajasthan vide gazette notification no. S.O. 99(E) dated 6th January, 2020. Pusa Super Sweet Corn 2 yielded more green ears compared to the checks in the 'agronomy trials' and it also responded well to the increased dose of fertilizers and the higher plant density.

F. Hossain*, V. Muthusamy, R. U. Zunjare, J. S. Bhat, T. Nepolean, R. N. Gadag, S. Basu, Sunil. K. Jha, R. Gogoi, D. K. Diwakar, R. Kumar and M. Kapasia

ICAR-Indian Agricultural Research Institute, New Delhi 110 012

*Corresponding author's e-mail: fh_gpb@yahoo.com



Chickpea

Variety RKGK 13-414 (Kota Kabuli Chana3)

Chickpea (*Cicer arietinum* L.) is an important pulse crop worldwide that contributes 34% and 49% respectively to the of total area and production of pulses in India due to its immense economic and nutritional value. In India, the chickpea has immense economic and nutritional value with respect to human population. Besides high seed yield, the resistance to major diseases and insect pests is one of the major breeding objectives of chickpea in order to check the use of the pesticides and insecticides and to retain the appearance and quality of the harvested product. A new high yielding, kabuli chickpea variety, RKGK 13-414 (Kota Kabuli Chana3) has been developed by Agricultural Research Station, Kota (Agriculture University, Kota). The variety has been derived from the cross between BG 1044 and BG 1111. Based on the yield performance in station trials, RKGK 13-414 was included in the All India Coordinated testing programme during 2018-19 in IVT trials for testing over multi-locations. Based on its yielding ability and quality traits, it was released by the Central Sub Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops, Government of India and notified vide S.O. 8(E) dated 24th December, 2021 for commercial cultivation under timely sown, irrigated conditions of

West Central Zone (WCZ) comprising of Madhya Pradesh, Maharashtra, Gujarat, Rajasthan and Uttar Pradesh. It gave an average yield of 17.79 q/ha under three years of testing in coordinated trials with yield potential of 30 q/ha. On weighted mean basis, it out yielded the kabuli and extra-large seeded kabuli checks viz., KAK 2, PKV 4 and Phule G 0517 by 23-25%. Out of a total 21 locations during three years of testing in coordinated trials conducted under AICRP on Chickpea, variety RKGK 13-414 appeared superior 11 times as against 2, 4 and 5 times, respectively over the check varieties Phule G 0517, PKV 4 and KAK 2.

The variety, RKGK 13-414 is medium tall, producing semi erect plants, single white flowers and pods, wrinkled, cream colour, medium bold seed. The range of days to 50 per cent flowering is 58-61 days with the mean of 59 days, while maturity period is about 113 days with a range of 110-115 days depending upon the locations and production conditions. The plant height recorded is 55-65 cm with 100-seed weight of about 27.0 g. This variety is resistant to wilt, dry root rot, collar rot and stunt diseases and show lesser pod damage and larval population of *Heliothis armigera*. The grains of this variety contain 18.66% protein. Hence, this elite variety with high yield potential, medium bold seed and multiple disease resistance may be a suitable replacement of existing old varieties to raise the chickpea productivity.

Preeti Verma*, **S.S. Punia**¹, **C. Bharadwaj**²

AICRP on Chickpea, Agricultural Research Station, Kota, Agricultural University, Kota 324 001, Rajasthan; ¹Department of Plant Breeding & Genetics, SKN College of Agriculture, SKNAU, Jobner, Rajasthan; ²Division of Genetics, Indian Agricultural Research Institute, New Delhi 110 012

Corresponding author's e-mail: preetiarskota2005@hotmail.com



Variety, Sabour Chana-2

The share of chickpea area and production of Bihar in a total national area and production of is merely 2% due to several constraints. The economically viable option is the increase of area and production that could be possible through rehabilitation of chickpea in vast area available after harvest of medium and late paddy under rainfed situation. After kharif harvest, the fallow land (about 1.0 m ha) in Bihar is available which is most suitable for pulses cultivation. These lands potentially offer expansion of chickpea cultivation in Bihar.

A desi chickpea (*Cicer arietinum* L.) variety, Sabour Chana-2 developed by the Bihar Agricultural University, Sabour, Bhagalpur has been bred through hybridization {(IPC 98-12 x ICCV96029)/IPC10-59} followed by selection. Based on the yield performance with and other useful traits observed in state trials, the variety Sabour Chana-2 has been identified by the Varietal Identification Committee (VIC), BAU, Sabour on Chickpea in its 18th Research Council

Meeting held on 26-27th September, 2019. Subsequently, based on the approval of VIC, this variety was recommended for release in the meeting held on 20.01.2020 by SVRC, Patna and later on notified by the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops (CVRC) in its 87th meeting held on 22nd September and 18th October, 2021, vide gazette Notification No. S.O. No. 8 (E) dated 24th December 2021 for commercial cultivation under late sown conditions of Bihar.

This variety can be sown between 10 and 20th December, after harvest of paddy. Its productivity under late sown condition ranged from 1800-2000 kg/ha. The variety has also shown consistent grain yield superiority at different locations under state varietal trial of chickpea (SVT-Bihar) for three consecutive years (Rabi 2016-17, 2017-18 and 2018-19). Sabour Chana-2 has also shown grain yield superiority in IVT (Desi) late trials at different locations in North Eastern Plains Zone of India during, rabi 2018-19 and secured number one position. It has given 20.8 and 19.1 per cent higher grain yield

over checks, PG 186 and BG 372, respectively.

Its plant type is semi erect with an average plant height of about 65 cm which makes it suitable for mechanical harvesting. It has property of profuse branching with some tertiary branches resulting into more number of pods/plant; each peduncle bears two pods which make this variety unique in respect of morphological features. The pod size is small with attractive brown colour angular seed with smooth testa structure. It produces small seed (14.5 g/100 seeds), the

leaflets are also small sized and bears double purple flower per peduncle. It is moderately resistant to major diseases and pest and tolerant to high temperature at reproductive stage. The variety matures in around 125 days with an average 19.8 % seed protein content. With the availability of the suitable variety for late sown conditions, the large rice fallow areas can also be brought under chickpea cultivation in order to increase farmers' income.

Rafat Sultana*, S.K. Chaturvedi¹ and Sanjay Kumar

Bihar Agricultural University, Sabour 813 210, Bihar;

¹College of Agriculture, Rani Lakshmi Bai Central Agricultural University, Jhansi 284 003, Uttar Pradesh

*Corresponding author's e-mail: rafat.hayat@gmail.com



Variety, Sabour Chana-1

The chickpea productivity in Bihar state is about 1012 kg/ha which is higher than the national average of 841 kg/ha. Despite of huge potential and the comparative advantage, the production of chickpea in the state has experienced a major setback. Therefore, the concerted breeding efforts are needed to develop suitable high yielding genotypes to enhance the total production of chickpea in Bihar. A desi chickpea (*Cicer arietinum* L.) variety, Sabour Chana-1 has been developed by the Bihar Agricultural University, Sabour, Bhagalpur through hybridization {(PG05 x H82-2) x (PG05 x GNG 463)/IPC2005-66} followed by selection.

The variety was tested at different locations under state varietal trial of chickpea (SVT-Bihar) for three consecutive years in rabi 2014-15, 2015-16 and 2016-17 and has shown consistent grain yield superiority. It was entered in IVT (Desi-normal sown) trials at different locations in north east plain zone (NEPZ) comprising eastern Uttar Pradesh, Bihar, Jharkhand, parts of West Bengal and Assam during in rabi 2016-17 and showed distinct yield superiority in yield. The variety Sabour Chana-1 has given 36.16 and 37.15 per cent higher grain yield over checks, GCP105 and KWR 108, respectively.

Based on the yield performance, the variety Sabour Chana-1 was identified by the Varietal Identification Committee (VIC) met on 12-13th October, 2017 during 14th Research Council Meeting at BAU, Sabour. Subsequently,

based on the approval of VIC, this variety was recommended for release in the meeting held on 22.11.2018 by the SVRC (Memo no. 09/DSSC/Meeting/03/2016/5598/Ag, Patna (Bihar)) and later on it was notified by the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops (CVRC) vide Gazette Notification S.O. No. 91 (E), dated 6th January 2020 for commercial cultivation under normal sown conditions of Bihar.

Sabour Chana-1 is suitable for normal sowing and can suitably be sown up to 30th November. It produced 2200-2400 kg/ha grains under normal sown condition. The plant type of Sabour Chana-1 is semi erect with an average plant height of about 60 cm. which makes it suitable for mechanical harvesting. It has property of profuse branching with few tertiary branches resulting into more number of pods per plant; usually each peduncle bears single pod. The pod size is bold with attractive yellow colour angular seed with smooth testa structure. The seed of Sabour Chana-1 is bold (25.98 g/100 seeds), and leaflets are large sized. It is moderately resistant to major diseases including wilt and dry root rot and also moderately resistant to pod borer. The variety takes around 135 days to mature and has an average grain protein content of 22.66%. The cultivation of desi chickpea variety, Sabour Chana-1 is expected to produce high yield that may ensure increase in farmers' income and nutritional security to the state.

Sanjay Kumar, Rafat Sultana*, Anand Kumar and S.K. Chaturvedi¹

Bihar Agricultural University, Sabour 813 210, Bihar; ¹College of Agriculture, Rani Lakshmi Bai Central Agricultural University, Jhansi 284 003, Uttar Pradesh

*Corresponding author's e-mail: rafat.hayat@gmail.com



Soybean

Variety MACSNRC 1667

Soybean is a globally accepted oilseed and legume crop due to high protein content and good quality oil in its seed. However, its food use has limitations due to the presence of a high concentration of anti-nutritional factor (trypsin inhibitor) affecting the protein digestibility. The inactivation of kunitz trypsin inhibitor (KTI) in unfermented products need moist heating at 900-1000 C for at least 20 minutes. However, this process has its shortfalls and is costlier. Even after the thermal inactivation, the residual activity of this anti-nutrient persists in the final product. To overcome this and explore the food use of the soybean, the genetic elimination of trypsin from its seed would be the best option. Hence, efforts have been made at MACS Agharkar Research Institute, Pune to develop the KTI free soybean variety.

MACSNRC1667 (IC No. 638658) is a kunitz trypsin inhibitor free, essentially derived variety (EDV) of soybean, developed at MACS Agharkar Research Institute, Pune in collaboration with ICAR-Indian Institute of Soybean Research, Indore (M.P.). It has been developed from a cross between soybean cultivar, MACS 450 and an exotic accession, PI542044 through marker-assisted backcross breeding method transferring the null allele KTI. The cultivar MACS 450 is derived from a cross Bragg x MACS 111 (Kalitur mutant) while the accession PI542044 (Maturity Group III), also known as kunitz soybean, which carry the null allele of KTI.

MACSNRC 1667 has been identified and subsequently notified by The Central Sub-Committee on Crop Standards, Notification and Release of Varieties of Agricultural Crops

(CVRC) vide notification No. S.O. 2986 (E) dated 20.07.2021 for cultivation in the Southern zone of India comprising Maharashtra, Karnataka, Telangana, Andhra Pradesh and Tamilnadu states, excluding rust-prone areas. It is suitable for cultivation in rainfed conditions with assured rainfall and medium to heavy soil. MACSNRC 1667 has recurrent parent genome content (RPGC) of 94%. It has given equivalent yield (21.49q/ha) to the recurrent parent MACS 450 (20.80 q/ha) in three years of coordinated trials at the southern zone of India. It has given consistently high and stable yield during three years of testing and matures in 96 days. Morphologically, MACSNRC 1667 has semi determinate growth habit, non-lodging plant type with 3-4 branches, medium plant height (average 56 cm), bears purple coloured flowers between 33 to 37 days after sowing, bears average 48 number of pods per plant, the pubescence present on pods, it is resistant to pod shattering at maturity, round and medium size seeds with yellow seed coat and black hilum, has 100 seed weight of 14.84 g (average), contains 19.01% oil in seed and the seed has better seed germinability.

MACSNRC 1667 is resistant to stem fly, pod borer, and highly resistant to defoliators. Also, it has resistant high yielding (R-HY) reaction to insect-pest complex. Agronomically, it is highly adaptive to sowing on 45 cm row to row spacing with 5-7 cm spacing between the plants and gave the best yield of 20.04 q/ha. Considering the quality characteristics and suitability, a Trypsin Inhibitor free Soybean variety MACSNRC 1667 has been released for cultivation in the southern zone of India. It is expected that the variety will gain popularity among the farmers who will prefer to cultivate a better variety to supplement their farm income.

Philips Varghese, S. A. Jaybhay*, M. D. Oak, Vineet Kumar¹, Anita Rani¹, B. D. Idhol, B. N. Waghmare and D. H. Salunkhe
MACS Agharkar Research Institute, G.G. Agarkar Road, Pune, Maharashtra 411 004; ¹ICAR Indian Institute of Soybean Research, Khandwa Road, Indore 452 001, Madhya Pradesh

*Corresponding author's email: sajaybhay@aripune.org

