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Notification and germplasm registration

Basmati Rice

Variety Pusa Basmati 1882

Pusa Basmati 1882 (IET 28788) is a MAS derived near isogenic line (NIL) of a popular Basmati rice variety, Pusa Basmati 1 developed through molecular marker assisted backcross breeding by the Division of Genetics, ICAR-Indian Agricultural Research Institute, New Delhi. The variety possesses a major QTL, *qDTY1.1* governing tolerance to reproductive stage drought stress, sourced from an upland rice variety, Nagina 22. Foreground selection for the QTL was carried out using the QTL linked molecular marker, RM431. Foreground selection was supplemented with the stringent phenotypic selection for agro-morphological, grain and cooking qualities to accelerate the recovery of recurrent parent phenome. Further, background analysis using 114 polymorphic SSR markers revealed the recurrent parent genome recovery of 99.56% in the drought tolerant NIL, PB 1882. It has a seed-to-seed maturity of 134 days and produces an average yield of 4.69 t/ ha under irrigated transplanted condition. This variety was identified by the Variety Identification Committee at the 57th Annual Rice Group Meeting held on 27th April 2022. It has been assigned with the national identity number of IC644533. Pusa Basmati 1882 (PB 1882) has been approved for release by the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for the states of Western Uttar Pradesh, National Capital Region of Delhi, Uttarakhand, Haryana, Punjab and Jammu and Kashmir of the Basmati GI area of India and notified vide Gazette No. S.O. 4065(E) dated 31. 08. 2022.

Pusa Basmati 1882 is the first Basmati rice variety with inbuilt tolerance to reproductive stage drought stress, which has exhibited significant superiority of 101.5% with an average yield of 987.5 kg/ha over the recurrent parent (490 kg/ha) for reproductive stage drought stress under rainout shelter based on two years of testing. Under irrigated transplanted condition, it produced an average yield of 4.69 t/ ha with yields as high as 5.97 t/ ha at ICAR-IARI, New Delhi in the National Basmati trials. Developed from a back cross, Pusa Basmati 1/Nagina 22//Pusa Basmati 1*3, this variety possesses non-lodging and non-shattering habit. In the AICRIP trials, Pusa Basmati 1882 has exhibited 9.31% yield superiority over recurrent parent, Pusa Basmati 1. Generally, this variety produces 13-16 tillers/plant with an average number of 328 panicles per sq m. It has long panicles with an average length of 29.7 cm which are completely exerted. The grains of Pusa Basmati 1882 are awned with non-pigmented apiculi and weigh 22.2 g per 1000 grains. In the traditional Basmati growing locations, this variety exhibits similar reaction to major diseases and pests as compared to the recurrent parent, Pusa Basmati 1 in Basmati growing locations. The reaction of PB 1882 (IET 28788) to the major diseases and pests was comparable to recurrent parent, Pusa Basmati 1. It showed comparatively lesser incidence of stem borer in Pantnagar, Kaul as compared to the recurrent parent during 2020. Grain processing parameters of Pusa Basmati 1882 is very good, with an average milling per cent of 70.0% and head rice recovery (HRR) of 55.7%. This variety also possesses grain and cooking quality similar to the recurrent parent, Pusa Basmati 1. It possesses long slender grains (7.1 mm) with very occasional grain chalkiness, very good kernel length after cooking (14.6 mm) with an elongation ratio of 2.1, intermediate amylose content (24.4 %) and strong aroma. In the panel test, the variety exhibited flaky appearance, tenderness on touching and chewing, desirable taste and optimum aroma with good elongation and overall acceptability 3.25 and 3.5, respectively which is on par with the recurrent parent, Pusa Basmati 1

The ground water level in parts of Punjab and Haryana is going down due to pumping of water for irrigating rice during *Kharif*. With the decreasing availability of irrigation water for cultivating rice, there will be water stress on Basmati rice. As Pusa Basmati 1882 is tolerant to reproductive stage drought stress tolerance, it will help in reducing the irrigation water requirement, thereby economizing water in cultivating Basmati rice, which will help in sustaining the Basmati rice production.

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Rice

Variety Pusa Samba 1853

Pusa Samba 1853 (IET 28014) is a MAS derived near isogenic line of the popular medium slender grain rice variety, "BPT 5204" (Samba Mahsuri) with inbuilt resistance to both bacterial blight and blast diseases. It possesses two genes governing resistance to bacterial blight disease namely *xa13* and *Xa21*, and three genes governing resistance to blast disease namely, *Pi54, Pi1* and *Pita*. It has been developed through marker assisted backcross breeding at the Division of Genetics, ICAR-Indian Agricultural Research Institute, New Delhi. Pusa 1850-5-18, a MAS derived NIL of BPT 5204 was used as the donor for three genes governing resistance to blast disease namely, *Pi54, Pi1* and *Pita*, while the two bacterial blight genes were sourced from Pusa1701-10-5-8, a MAS derived bacterial blight resistant elite medium slender grain rice line possessing the genes governing resistance to bacterial blight, namely, *xa13* and *Xa21*. Gene based markers, pTA248 (*Xa21*), xa13-prom (*xa13*), Pi54MAS (*Pi54*), YL87/155 (*Pita*) and YL87/183 (*Pita*) and gene linked molecular marker, RM1233 (*Pi1*) were used for foreground selection and stringent phenotypic selection was carried out for agro-morphological, grain and cooking qualities, followed by background selection which aided in accelerated recovery of recurrent parent phenome as well as genome. A total of 55332 polymorphic SNPs distributed across the 12 rice chromosomes were used for background analysis using 80K rice pangenome SNP array, which revealed the recurrent parent genome recovery of 90.98% in the NIL, Pusa Samba 1853. This variety was identified by the Variety Identification Committee at the 57th Annual Rice Group Meeting held on 27th April 2022. It has been assigned with the national identity number of IC644534.

Pusa Samba 1853 has been released for the states of Andhra Pradesh and Telangana vide Gazette No. S.O. 4065(E) dated 31.08.2022. It is a semi-dwarf rice variety with a seed to seed maturity of 140-145 days and produces an average yield of 3.98 t/ha, but has shown the potential to produce yield as high as 5.23 t/ha (Bapatla). It is highly resistant to both BB [Average Susceptibility Index (SI) of 3.9] and blast disease [SI of 4.75] as compared to the recurrent parent, BPT 5204, which showed high susceptibility to both BB [SI of 6.1] and blast diseases [SI of 6.5]. Generally, this variety produces 12-15 tillers/plant with an average number of 320-343 panicles per sq m. The grains of Pusa Samba1853 are awnless with non-pigmented apiculi and weigh 14.5 g per 1000 grains. Pusa Samba 1853 has very high head rice recovery (68.80%), medium slender grains (5.60 mm) with non-chalky grains and intermediate amylose content (21.5%).

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Variety Pusa CRD KN2

Pusa CRD KN2 (IET26213) is an improved semi-dwarf version of a traditional short grain aromatic rice cultivar, Kalanamak. It has semi-dwarf stature with a seed-to-seed maturity duration of 145 days and recorded an average yield of 35q/ha in multilocation trials conducted across 10 KVKs located in the GI area of eastern Uttar Pradesh over a period of two years. It showed 31.9 % yield superiority over the check variety, KN3 which recorded an average yield of 26.2 q/ha. The variety also recorded an average yield of 32.2 q/ha in the on-farm trials conducted across 21 farmers' fields in the Siddarthnagar district with an average plot size of 1 acre. It was derived from the cross between traditional Kalanamak and an elite aromatic short grain breeding line, Pusa 1176. Pusa CRD KN2 was identified for release in the eleven districts of Uttar Pradesh (Bahraich, Balrampur, Basti, Gonda, Gorakhpur, Deoria, Kushinagar, Mahrajganj, Sant Kabir Nagar, Siddharth Nagar, and Shravasti) earmarked as GI area of Kalanamak in the 36th meeting of Uttar Pradesh State Seed Sub-committee held virtually on 27th March 2023 and subsequently released for commercial cultivation vide Gazette notification No. S.O. 4222(E) dated 25th Sep 2023.

The variety possesses typical black husk colour and medium slender grains with milled rice kernel length before cooking of 4.68 mm, kernel breadth of 2.00 mm before cooking, L/B ratio of 2.35, very good kernel length after cooking (8.89 mm), elongation ratio of 1.79, desirable ASV (6.73), intermediate amylose content (21.98 %) and strong aroma. The 2AP concentration of the variety was 231.2 ppb of 2 AP as compared to 38.9 ppb in KN 3.

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Variety Pusa Narendra KN1

Pusa Narendra KN1 (IET26204) is an improved semi-dwarf short grain aromatic rice variety in the genetic background of traditional Kalanamak. The variety has been released for commercial cultivation in the eleven districts of Uttar Pradesh (Bahraich, Balrampur, Basti, Gonda, Gorakhpur, Deoria, Kushinagar, Mahrajganj, Sant Kabir Nagar, Siddharth Nagar and Shravasti) earmarked as GI (Geographical Indication) area of Kalanamak in the 36th meeting of Uttar Pradesh State Seed Sub-committee held virtually on 27th March 2023 and subsequently released for commercial cultivation vide Gazette notification No. S.O. 4222(E) dated 25th Sep 2023. It was developed from the cross between traditional Kalanamak and an elite aromatic short grain breeding line, Pusa 1176. It has a seed to seed maturity of 145 days and produced an average yield of 36 q/ha in multilocation trials conducted across 10 KVKs located in the GI area of eastern UP over a period of two years. It showed 39.1 % yield superiority over the check variety, KN3 which recorded an average yield of 26.2 q/ ha. The variety has also been extensively tested in the on-farm trials in farmers' fields of Siddarthnagar and Basti districts and recorded an average yield of 39.9 q/ ha and 46.6 q/ ha.

Pusa Narendra KN 1 possesses typical black husk colour, erect and non-lodging habit. The variety produces medium slender grains with milled rice kernel length and breadth of 4.83 mm and 1.75 mm before cooking and L/B ratio of 2.33. It has an average kernel length after cooking are of 8.39 mm, with an elongation ratio of 1.64, desirable ASV (7.0), intermediate amylose content (21.77 %) and strong aroma. Pusa Narendra KN1 has significantly higher content of the volatile biochemical compound, 2 acetyl-1-pyrroline (2AP), which is 289.9 ppb as against 38.9 ppb recorded by the check variety KN3, thereby responsible for the characteristic popcorn like aroma in this aromatic rice variety.

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Chickpea

Variety RKGK 13-416 (Kota Kabuli Chana 4)

A new high yielding, kabuli chickpea variety RKGK 13-416 (Kota Kabuli Chana 4) has been developed by University, Agricultural Research Station, Kota, Rajasthan. It is derived from the cross between BG 1044 and BG 1111. Based on the yield performance in station trials, RKGK 13-416 was entered in the All India Coordinated testing programme during 2018-19 in IVT for testing across the agroclimatic zones. Based on its overall performance in terms of yield and resistance to diseases, it was identified by the Variety Identification Committee (Rabi Pulses) meeting held online on September 26, 2022. Consequently, the variety has been released vide notification No. S.O. 4222(E), dated September 25, 2023 by the Central Sub Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops, Govt of India for cultivation under timely sown, irrigated conditions of South Zone comprising of states of Andhra Pradesh, Telangana and Karnataka

It recorded an average yield of 1659 q/ha over three years of testing in coordinated trials with yield potential of 2700q/ha. On weighted mean basis, it out-yielded the kabuli and extra-large seeded kabuli checks, namely, NBeG 119, KAK 2 and MNK 1 by 27, 37 and 51 per cent, respectively. Out of a total of ten locations during three years testing in coordinated trials conducted under AICRP on Chickpea, variety RKGK 13-416 showed superiority eight times as against two times over the check varieties, NBeG 119 and KAK 2.

The variety RKGK 13-416 has medium tall, semi erect plants with single white flowers and pods, wrinkled, cream colour, medium bold seed. The range of days to 50 per cent flowering is 46-50 days with the mean of 48 days, while maturity period is about 98 days with the range of 96-102 days depending upon the locations and production conditions. The plant height recorded is 65-70 cm with 100-seed weight of around 26.83g. The variety showed high nodulation, nodule weight and leghaemoglobin content over the checks. This variety is resistant to wilt, dry root rot, collar rot and stunt diseases and show lesser pod damage and larval population of *Helicoverpa armigera*. The grains of this variety contain 20.08 % protein. Hence, this elite variety with high yield potential, medium bold seed and resistance to major diseases may be a new option for varietal replacement of existing varieties to raise the chickpea productivity.

The variety RKGK 13-416 has been registered in NBPGR, New Delhi as germplasm (IC0633090).

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Sunhemp

Variety, ADT 1

Sunhemp (*Crotalaria juncea* L.) is mainly cultivated as a green manure crop in Tamil Nadu and is rich in biomass, macro, and micronutrients and improves microbial activity in soil to enhance and maintain soil fertility. Sunhemp is well adapted to irrigated garden land and rainfed upland conditions of Tamil Nadu. Due to changes in cropping patterns, soil fertility is getting reduced as a result of poor microbial activity and depletion of nutrients from the soil. It is expected that the cultivation of sunhemp is likely to improve soil fertility. Since there is no notified variety available in Tamil Nadu, the Dept of Agriculture and Farmers Welfare, Tamil Nadu expressed its need for the development of a sunhemp variety to be notified as a distinct variety of the state to enter into the seed production chain. Keeping in view the need, the variety Sunhemp ADT 1 was developed at Tamil Nadu Rice Research Institute (TRRI), Aduthurai to fulfill the requirement of a stable high biomass yielder which may prove an excellent green manure crop to enrich the soil nutrient status.

ADT 1 is a selection from the derivatives of the intercrosses of SH4, CO1, SUIN 53 and JRJ610 during 2016-17 and the culture was named as ADSH 17001. In preliminary yield evaluation trials at TRRI, Aduthurai between 2019 to 2020, the culture ADSH 17001 registered an average biomass yield of 23.1 t/ha, which is 26.9 and 49.5 per cent higher than the local check CO1 (18.2 t/ha) and national check SH4 (15.45 t/ha), respectively. Based on its superior performance in station trials and fast decomposition ratio, ADT 1 was nominated to Multi-location trial (MLT) during 2020-22. The MLTs were conducted consecutively for two years.

The culture ADSH 17001 was tested at different research stations of TNAU during 2020-21and 2021-22. In the first year of MLT during 2020-21 the culture was tested along with two checks, CO1 and SH 4. It registered an average biomass yield of 12.2 t/ha (2020-21) which is 68.5 and 103.3 per cent higher than CO1 Local check and SH, respectively. During the second year of testing, the performance of ADSH 17001 was assessed only with CO1 local check and recorded a biomass yield of 15.3t/ha, which is 19.6 per cent higher than CO1 (12.8 t/ha). ADSH 17001 registered a mean biomass yield of 13.7t/ha from 9 locations, which is 37.2 per cent higher than the check CO1 local check (10 t/ha) and 129.6 per cent higher than the check SH 4 (6t/ha) in pooled MLT results. Based on the consistence performance of ADSH 17001 against the checks, it was promoted for testing in Adaptive Research Trials (ART) through the Department of Agriculture and Farmers Welfare. The culture ADSH 17001 was tested under ART trials in 25 locations during 2022-23 and registered a mean biomass yield of 20.67 t/ha, which is 13.4 per cent higher than the check CO1 (18.23 t/ha).

To assess the performance of ADSH 17001 under farmers' fields, a total of 68 On Farm Trials (OFTs) were conducted from 2019 to 2022 along with CO1 local check in Thanjavur, Tiruvarur and Mayiladuthurai districts. In OFTs, ADSH 17001 recorded an average biomass yield of 21.7 t/ha which is 39.3 per cent higher than CO1 local check.

A total of 107 trials were conducted during 2019 to 2022 to assess the yield potential of ADSH 17001 in comparison with check varieties CO1 and SH 4. The culture, ADSH 17001 registered a mean biomass yield of 20.8 t/ha, which is 31.9 per cent higher than the CO1 local check. Field days were conducted to popularize the culture among farmers. Based on the SVRC recommendations 2023, the sunnhemp variety ADT 1 was released as a green manure variety suitable for irrigated and rainfed ecosystems of Tamil Nadu. Consequently, it has been notified by the Central Sub-committeeon Crop Standard, Notification and Release of Varieties in the Gazette of India vide notification no. S.O. 4222(E), dated 25th September 2023. The variety ADT 1 has been registered in NBPGR as a germplasm line (IC647768).

It matures in 120 days as a seed crop and is highly suitable for kharif and rabi as a green manure crop with a duration of 45-60 days. ADT 1 is a tall and robust variety having plant height of 210-220 cm, lanceolate leaf, and cylindrical stem with ribbed surface. It produces yellow colour flowers, light hairy black colour pods with dark grey coloured seeds. This variety is suitable for irrigated and rainfed ecosystems of Tamil Nadu with an average biomass yield of 20.79 t/ha. The green manure crop can be ploughed in the soil for 45-60 days (flowering stages). Seed production of this variety is recommended between January to April months.

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