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'HDCSW 18' wheat

the first ever variety for conservation agriculture in India

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To exploit the better production environment under conservation agriculture, it is essential to develop the variety responsive to such environment. During 2015-16 country had witnessed the fall of wheat production by atleast 3 to 4 million tonne due to increasing unpredictability of temperature in March. Therefore, the future for wheat in India lies in advancing plantings to late-October or even earlier.

Key words: Conservation agriculture, Variety, Wheat

THE 'HDCSW 18' wheat is one of such varieties, developed by the Indian Agricultural Research Institute, New Delhi, which met this entire criterion and showed sign of strong genetic gain, if seeded early. This variety was developed from the cross PBW 343 × CL 1538 following pedigree method, released by the Central Sub-Committee on Crop Standards, Notification and release of varieties for agriculture crops and notified vide S. O. 2238 (E) dated 29 June 2016 for commercial cultivation under irrigated, early sown conditions of Conservation Agriculture for the National Capital Region.

Yield superiority and adaptability: Due to unavailability of production condition i.e. Conservation Agriculture (CA) in coordinated centers this variety was tested under CA conditions for two consecutive years across ten locations in north-west, north-east and central zone by an independent agency like CIMMYT and it out yielded all checks including HD 2967, PBW 550 and DBW 17 (Table 1). Under NCR testing for two years, 'HDCSW 18' wheat recorded an average yield of 6.29 tonne/ha and showed significant superiority of yield over check varieties 'HD 2967' (11.13%), 'PBW 550' (18.83%) and 'DBW 17' (20.75%), Table 2. This variety has recorded yield potential of 7.87 tonne/ha at Ranchi, Jharkhand in 2011-12 under CA conditions. The 'HDCSW 18' wheat showed wide adaptation across the zones.

Morphological characteristics

'HDCSW 18' wheat has semi-erect growth habit with dark green foliage at boot stage and no anthocyanin pigmentation of auricles. It has erect, medium to long, broad-sized, dark green and light waxy flag leaf with hairy auricles. It has very strong waxiness of the leaf sheath. 'HDCSW 18' wheat is slightly tall (110 cm) with average 96 and 145 days of 50% flowering and maturity respectively. Peduncle of 'HDCSW 18' wheat is medium-curved with white-coloured, medium waxy, along spike which bears medium white awns. The longer glume has slanting to round shoulder with long straight

Table 1. Mean yield over two years in multi location testing in collaboration with CIMMYT under conservation agriculture condition and per cent gain over checks

Sr. No	Entry name of wheat	Mean yield (tonne/ha) 2010-11	Mean yield (tonne/ha) 2011-12	Over all mean (tonne/ha) yield	Rank	Per cent gain over		
						HD 2967 wheat	DBW17 wheat	PBW 550 wheat
1	CSW 1	5.72	5.08	5.40	6	-1.9	9.1	7.6
2	CSW 4	5.23	5.14	5.18	7	-5.8	4.8	3.4
3	CSW 5	5.51	4.50	5.00	9	-9.1	1.1	-0.2
4	CSW 15	5.82	6.02	5.92	2	7.6	19.6	18.0
5	CSW 16	5.92	5.76	5.84	3	6.1	18.0	16.4
6	CSW 18	6.01	6.07	6.04	1	9.7	22.0	20.4
7	MUNAL	6.24	4.86	5.55	4	0.9	12.2	10.7
8	DBW 17	5.04	4.85	4.95	10	-10.1	0.0	-1.3
9	PBW 550	4.68	5.34	5.01	8	-8.9	1.3	0.0
10	HD 2967	5.51	5.49	5.50	5	0.0	11.2	9.7



HDCSW 18 at Maturity



HDCSW 18 at vegetative stage



Grain of HDCSW 18

beaks. 'HDCSW 18' wheat possess amber-coloured, elliptical to oblong, medium-, semi-hard grain with medium germ width.

Performance in agronomical evaluation

In the agronomical trails conducted under early sown and normal sown conditions, 'HDCSW 18' wheat showed superior performance (6.36 tonne/ha) when compared with 'HD 2967' (5.46 tonne /ha), 'PBW 550' (4.92 tonne/ ha) and 'DBW 17' (4.39 tonne/ha). The fitness of 'HDCSW 18' wheat for early seeding is evident from the data that it recorded yield advantage over 'HD 2967' (16.4%), 'PBW 550' (29.0%) and 'DBW 17' (44.7%), Table 3). Under normal sown conditions, 'HDCSW 18' wheat recorded up to 10% yield advantage over the checks. 1,000 grain weight of 'HDCSW 18' wheat is 40 g which is higher than 'HD 2967' wheat.

Table 2. Summary yield data of the varietal trials.

Parameters	Year of Testing	No. of trials	Proposed variety 'HDCSW 18'	Checks		
				HD2967	PBW550	DBW 17
Mean yield (tonne/ha)	First year	3	5.86	5.15	4.87	5.37
	Second year	4	6.33	5.91	5.96	5.34
	Third year	3	6.65	5.83	4.82	4.86
	Weighted mean		6.29	5.661	5.294	5.21
Percentage increase or decrease over checks	First year		0.0	9.1	20.5	1.3.8
	Second year		0	6.2	18.5	7.2
	Third year		0.0	14.11	38.03	36.87
	Weighted mean		0.00	11.13	18.83	20.75

Table 3. Adaptability to change in agronomic conditions.

Nature of experiments	Item	Proposed variety 'HDCSW18'	Checks		
			'HD 2967'	'PBW550'	'DBW17'
Sowing date experiments	Yield (tonne/ha) under recommended sowing date	6.36	5.46	4.92	4.39
	Percentage gain or loss when sown	Early	16.4	29.0	44.7
		Normal	2.5	7.2	10.1
		Late	-1.10	-3.73	-1.46

Resistance to major diseases and pest

Stripe rust is an important yield reducing biotic factor in north-western plains zone. 'HDCSW 18' wheat has a moderate level of resistance to stripe rust (ACI 18.6) when compared with 'DBW 17' (29.5) under artificial epiphytotic conditions. Moderate level of resistance in 'HDCSW 18' wheat under artificial condition will prove beneficial as a moderate level of resistance are generally more durable and does not force the pathogen to evolve in more aggressive and virulent form. Also, early sown i.e. October sown condition itself is unfavourable for stripe rust development, largely because of the seedling stage which is more vulnerable to primary infection escape infection. Adult plants are generally more tolerant and even in case of some infection occur, the very limited period is available for the disease to complete the desired number of cycles to cross threshold limit for causing economic losses. This variety has better resistance (ACI: 0.0) in comparison to check 'HD 2967' (ACI:5.0) for leaf rust, the disease most relevant and important in the national capital region. This variety has comparatively lesser ACI (6.6) against check 'HD 2967' (23.0) for stem rust under multilocation and artificial testing. Besides, this variety also showed resistance to wheat aphid which is becoming a major pest in present time.

Grain quality

The varieties 'HDCSW 18' wheat possess superior grain quality parameters of highest sedimentation value (50 ml) among all the three check varieties i.e. 'HD 2967', 'PBW 550' and 'DBW 17'. High sedimentation value is indicative of good bread making quality. It also has good hectoliter weight (79.6), grain appearance score (7.5) along with an average grain protein content of 12.39 %. It meets the criteria for superior bread making qualities and may find favour with bread-making industry.

SUMMARY

The 'HDCSW 18' wheat showed higher yield potential and suitable rice-wheat cropping system in Delhi and NCR. Terminal heat has caused great fluctuation in wheat production over the years (beween 2012-13 and 2015-16) and seeding of wheat early through varieties like 'HDCSW 18' wheat will provide the scope from escaping the terminal heat and getting assured yield.

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