



VL Dhan 207 and VL Dhan 208, the new high yielding varieties of spring rice for Uttarakhand hills

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Rice plays a distinct role in the food and nutritional security of tribal, backward, and hilly areas of Uttarakhand. Being the most important crop, it is grown mainly under two ecosystems viz., direct seeded rainfed upland and irrigated transplanted conditions. Traditionally, the crop is sown in the terraces, confined to rainfed upland ecology during the spring season particularly on 2nd fortnight of March to 1st fortnight of April. It is harvested by the end of September in the cropping sequence of spring rice-wheat-finger millet-fallow in a two years rotation. The cultivation of spring rice is peculiar in hills of Uttarakhand, which is locally known as '*Chaiti Dhan*.'

In hills, rice straw is an important source of fodder. Thus, farmers prefer varieties having good straw yielding along with grain yield. Therefore, farmers of this region prefer to grow semi-tall and tall varieties. In order to avoid lodging in such semi-tall/tall varieties, suitable genotypes should possess sturdy stems. Major limitations of rice productivity in hills include the biotic stresses (diseases, insects and weeds) and abiotic stresses (low temperature and inadequate soil moisture). Leaf and neck-blast, brown leaf spot, false smut among the diseases, and stem borer, leaf folder, and white grubs among the insects are the most important problems. Heavy weed infestation ranks only second to moisture stress in reducing grain yield of rainfed rice in the hills by as much as 42 to 100 per cent. Drastic yield reduction (83.7 to 100%) often results in spring rice, owing to prolonged growing season and also depending upon the intensity and type of weed flora. Low temperature affects rice crop at different growth stages from germination to maturity. The state of Uttarakhand although receiving a good amount of rainfall (1100 to 2370 mm, annually), suffers from erratic rainfall and high run off losses due to sloppy fields, limited soil depth and stoniness. Thus, the rice crop suffers adversely from varied levels of drought, resulting in lower productivity.

Keeping these attributes in mind, concerned breeding efforts were made at VPKAS, Almora to develop suitable genotypes of rice for spring-sown conditions. These efforts have led to development of two varieties viz., VL Dhan



207 and VL Dhan 208 which were released in 2006 by the Uttarakhand State Varietal Release Committee for cultivation under spring sown conditions.

VL Dhan 207. It was developed using the pedigree method involving VL Dhan 206 × Annada. Both of these genetically diverse parental lines have been successfully grown under rainfed condition. VL Dhan 206 is a popular variety of spring-sown condition, and Annada, is also a popular variety of rainfed rice cultivation in Orissa. Tested under the designation of VL 97-9729, VL Dhan 207 gave an average grain yield of 1.91 t ha⁻¹ in multilocational State Varietal Trial conducted during 2001-03 and out yielded the check Majhera 7 by 27.86% and VL Dhan 206 by 7.88% (Table 1). In multilocational adaptive trials under organic mode conducted at three locations in Uttarakhand in 2004, VL Dhan 207 had 41.18% and 48.65% yield superiority over Majhera 7 and VL Dhan 206, respectively. VL Dhan 207 is semi-tall statured (110–115 cm) and requires about 120–125 days to flower. It has strong stem with well-exerted, long, and compact panicles with medium bold (L/B ratio 2.12), straw coloured, awn less grains having test weight of 22.5 g per 1,000 seeds. The variety is moderately resistant to most prevalent diseases of the region like leaf and neck blast, leaf scald, and false smut. In addition, it showed resistance to pests like stem borer and leaf folder (Table 3).

Table 1. Grain yield performance of VL Dhan 207 in comparison to checks in State Varietal Trials, 2001-2003.

Genotype	Grain yield (t ha ⁻¹)				% Grain over
	2001	2002	2003	Weighted mean	
VL Dhan 207	2.972	1.492	1.493	1.915	–
VL Dhan 206 (C)	2.249	1.665	1.536	1.774	7.98
Majhera 7 (C)	2.198	1.174	1.419	1.571	21.86

Table 2. Grain yield performance of VL Dhan 208 in comparison to checks in State Varietal Trials, 2002-2004.

Genotype	Grain yield (t ha ⁻¹)				% Grain over
	2002	2003	2004	Weighted mean	
VL Dhan 208	1.196	1.986	2.059	1.996	–
VL Dhan 206 (C)	1.665	1.536	1.868	1.600	18.1
Majhera 7 (C)	1.174	1.419	1.772	1.490	34.0

**Table 3. Varietal characteristics of VL Dhan 207 and VL Dhan 208.**

Character	VL Dhan 207	VL Dhan 208
leaf blade pubescence	Intermediate	Intermediate
Leaf blade color	Dark green	Dark green
Ligule colour	White	White
Basel leaf sheath color	Dark green	Dark green
Flag leaf angle	Erect	Erect
Aunicle color	Pale green	Pale green
Panicle type	Compact	Compact
Panicle axis	Droopy	Droopy
Apiculus color	Straw	Straw
Awning	Awn less	Awn less
Panicle exertion	Well-exerted	Well-exerted
Panicle thresh ability	Easy	Easy
1000-grain weight (g)	22.5	22.8
Hulling recovery (%)	79.0	81.0
Milling recovery (%)	67.0	68.0
Kernel length (mm)	5.84	5.94
Kernel breadth	2.33	2.29
L/B ratio	2.50	2.59
Grain shape	Medium slender	Medium slender
Leaf blast ^a	4	5
Neck blast	5	3
Brown leaf spot	5	3
Sheath rot	5	3
Leaf scald	5	3
False smut	1	3
Stem borer	1	1
Leaf folder	3	3

^aMaximum score recorded over the years.

VL Dhan 208. This variety was developed from the genetically diverse parents VR 410-19 and VR 212. Both of these elite lines were developed at VPKAS, Almora through hybridization, aiming to combine tolerance to low temperature, moisture stress, and blast disease using parents of diverse origin. In multilocation State Varietal Trials conducted during 2002-04 in Uttarakhand, VL Dhan 208 (tested as VL 9632) gave an average grain yield of 1.99 t ha⁻¹, which was 34 and 18.1% higher than those of checks Majhera 7 and VL Dhan 206, respectively. It has at par for flowering (125–130 days) and maturity (160–165 days) period and plant height (105–110 cm) with the most popular variety of spring rice VL Dhan 206. Its well-exerted panicles are long (22–26 cm), compact and with droopy axis. Its awnless grains are medium (L/B ratio 2.59) in shape, straw colored, and weighs 22.8 g/1,000 seeds. The variety exhibited moderate level of resistance against prevalent diseases of the region like leaf and neck blast, leaf scald, and false smut. In addition it showed resistance to insect pests



Genetic resources

like stem borer and leaf folder (Table 3).

The release and cultivation of these varieties will not only add to varietal diversification of spring rice but also offer more varietal choice to hill farmers. So far, they had limited choice in VL Dhan 206 and Majhera 7, which were developed by pure line selection from local materials. VL Dhan 207 & VL Dhan 208, both were developed through recombination breeding involving diverse parental lines, will go a long way to fulfill the need of *Chaiti Dhan* growing farmers of Uttarkhand. Being semi-tall in stature, these varieties are capable of producing enough straw yield for the farmers' cattle.