

Elite early duration rice varieties for cultivation under rainfed upland organic conditions of Uttarakhand hills

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Early duration varieties of rice under rainfed upland condition of Uttarakhand hills have great potential due to its own advantages over long duration rice varieties being used by the farmers in most of the rainfed upland hill rice growing areas. Short duration varieties of rice have many advantages over long duration viz., suitably fit in annual cropping system of the hill farmers (enhance cropping intensity 150% to 200%), escape drought, fit for contingency planning etc. and have significant impact on rainfed upland rice production and productivity in the state. Use of improved rice varieties by the small and marginal hill farmers is an important avenue for reducing hunger, food insecurity and it also brings out significant improvement in socio-economic status of farmers of hill region of the State.

Keywords: Early duration variety rice, Organic, Rainfed upland

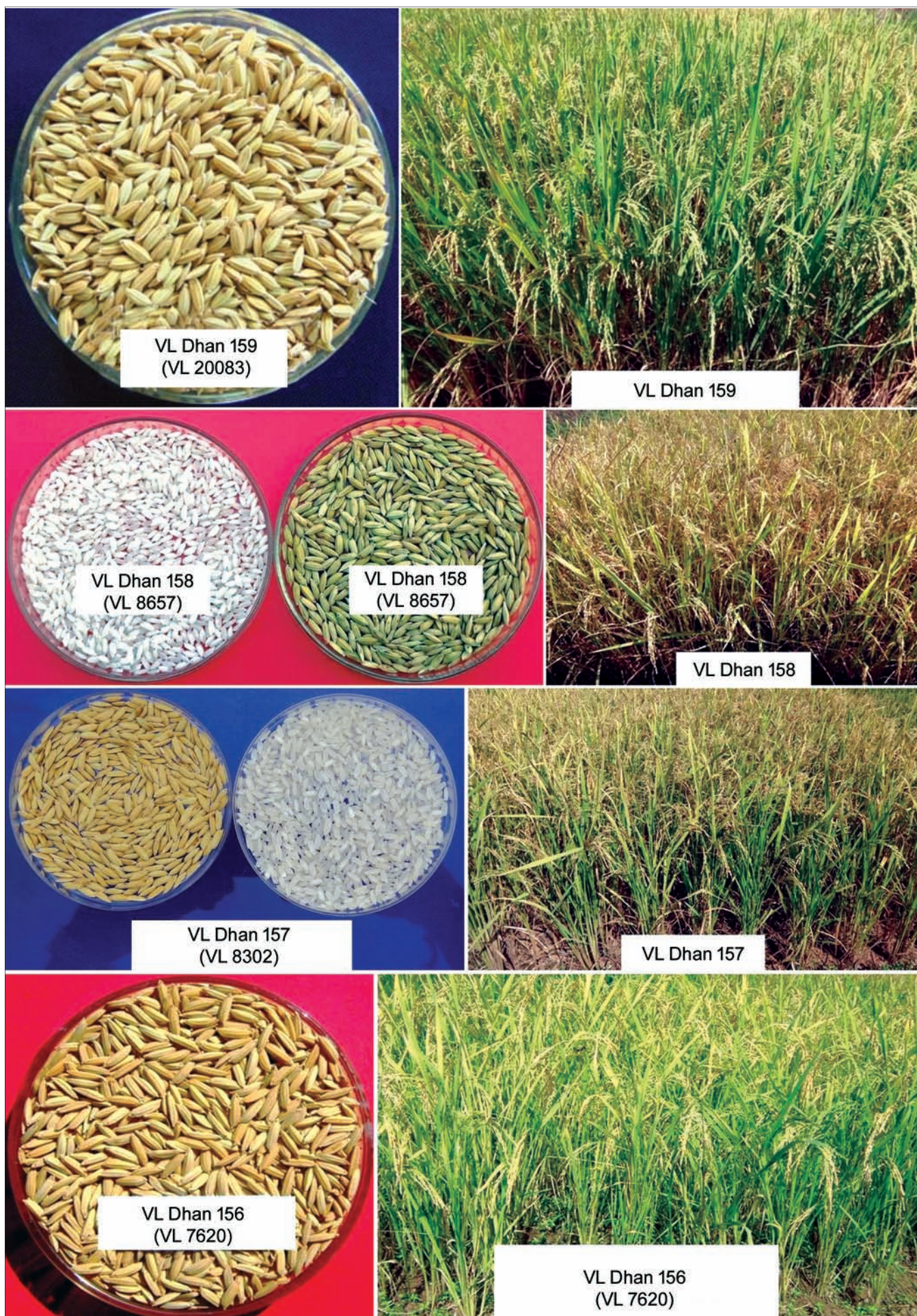
IN Uttarakhand, rice is cultivated in an area of about 260 thousand ha with 664 thousand tonnes production and productivity of 2,552 kg/ha. It is grown over a wide range of altitude varying from 250m to 2500m amsl and in two ecosystems i.e., irrigated and rainfed upland. The area of rice is more in plains (60%) as compare to hill (40%) and overall irrigated rice is higher (70%) than the rainfed upland rice (30%) but this figure is almost reverse in case of hill rice where about 67% rice is grown under rainfed upland condition compared to irrigated condition (33%). The challenges to rice production in the hills are different than that of plains and even in the hills it differs because of the soil moisture, soil fertility level, elevation and other microclimate. The plain region of the state experienced, benefited and witness of green revolution may be due to assured irrigation facility (almost 100%), high soil fertility and therefore, adoption of improved rice varieties whereas, hill regions have been bypassed by the green

revolution owing to 90% area under hills are rainfed, soils are fragile and less fertile. Several technological interventions have been suggested for higher crop production but use of improved variety quality seed is the most important, less expensive, very crucial, critical, basic and vital input for attaining sustained growth in crop production. It is well demonstrated that the use of quality seeds alone could increase 20-25% of the yield and under optimum management, the increase may touch upon 45%. Traditionally in hill regions, particularly Uttarakhand hills, rainfed upland rice is sown during spring season locally known as *Chaiti* or *Chetki Dhan* or in English Spring sown rice. The cultivation of spring sown rice is being practiced under two years crop rotation i.e., Spring rice (sown in March end/April and harvested by September end/Oct start)-Wheat (October to May)-Finger/Barnyard millet (June to September)-Fallow (October to / March)) which allows harvesting of only three crops in two years period with a cropping intensity of 150%

only. Concerted efforts have been made and short duration rice varieties have been developed which suitably fit in annual crop rotation for cultivation under rainfed upland conditions without any yield penalty and 200% cropping intensity successfully achieved. These newly released varieties matures in 115-120 days and can be grown under rainfed upland condition after onset of monsoon in the month of June and harvested in the month October to ensure timely sowing of successive any *rabi* crop.

VL Dhan 159 (IET 26598, VL 20083)

This is an early duration rice variety suitable for cultivation under rainfed upland organic condition of Uttarakhand hills. This was developed by ICAR-Vivekananda Parvatiya Krishi Anusandhan Sansthan (VPKAS), Almora, Uttarakhand for kharif season and released by the State Varietal Release Committee of Uttarakhand. It has been notified by the Central Sub-Committee on Crop Standards Notification and Release of Variety



for Agricultural Crops. VL *Dhan* 159 is derived from the cross VL 66/ HPR 2143 with maturity duration of 110-115 days. Under organic conditions, this variety has recorded an average yield of 2,054 kg/ha and out yielded the best check variety VL *Dhan* 221 by 27.34%. It was found resistant against leaf and neck blast (score 0-3), brown leaf spot (score 3-4), sheath rot (score 1), leaf scald (score 1-3) false smut (score 0) diseases and stem borer, leaf folder (score 0-1) insect pests under natural condition. It has more number of panicles/m² (229) compare to the best check *Vivek Dhan* 154 (200). This variety has semi-erect, intermediate and non-lodging plant type, compact and well exerted panicle, awnless grain and straw apiculus colour, green coloured leaf blade and leaf sheath and erect flag leaf. It has exhibited better quality characteristics like high hulling (82.8%) and milling (72.1%), intermediate Alkali Spreading Value (4.0), Gel consistency (50) and amylose content of 25.93%, Grain Chalkiness is very occasionally present. It has short bold grain kernel length (5.27mm), kernel breadth (2.63mm), L/B ratio (2.00).

VL *Dhan* 158 (IET 22982, VL 8657)

This variety was released and notified by the Central Sub-Committee on Crop Standards Notification and Release of Variety for Agricultural Crops, New Delhi vide S.O.1007 (E) dated 30 March 2017. It exhibited mean grain yield of 2,728 kg/ha in lower hills of Meghalaya, Manipur and Himachal Pradesh and 1,757 kg/ha in medium hills of Uttarakhand. It has been developed from a cross between RCPL 1-45/VL 3861. It is resistant against brown spot and blast, the most serious disease of upland rice in

Northern hill. It has light yellow, short bold, awnless grain, matures in 110-120 days and plant height of 110-125cm. It has shown 39.94%, 10.76% and 23.67% yield superiority over *Vivek Dhan* 154 (national check), *Sukradhan* 1 (regional check) and local check, respectively in the low elevated hills whereas, in medium hills 34.66%, 19.01% and 30.04% yield superiority was observed over national, regional and local check respectively.

VL *Dhan* 157 (IET 22292, VL 8302)

This variety was released and notified by the Central Sub-Committee on Crop Standards Notification and Release of Variety for Agricultural Crops New Delhi vide S.O.1919 (E) dated 30 July 2014, for lower hills of Meghalaya and medium elevated hills of Uttarakhand under direct seeded, rainfed upland June sown condition. It has an average yield potential of 2,050 -2,672 kg/ha in lower hills and 1,822-2,155 kg/ha in medium hills. It is developed from cross VR 9588/ A-57 with 100-110 days maturity duration. It has light yellow, short bold awnless grain and plant height of 95-105cm. It is resistant to leaf and neck blast.

VL *Dhan* 156 (IET 20955, VL 7620)

This is a rainfed upland early duration rice variety suitable for cultivation under organic condition in Uttarakhand hills. It was developed by crossing of VR 539-2 / VL 89-6036 // VL 6036 at ICAR-*Vivekananda Parvatiya Krishi Anusandhan Sansthan Almora*, Uttarakhand. This variety was released by the State Varietal Release Committee of Uttarakhand and subsequently notified by Central Seed Committee vide notification number S.O. 3540(E) dated 22 November,

2016. It has recorded grain yield of 2,451 kg/ha over three years of testing under organic condition and shown significant yield superiority of 35.36 per cent higher than the best check *Vivek Dhan* 154 (1,864 kg/ha). This variety has long slender and shiny grain under rainfed upland conditions whereas mostly rice varieties have short bold grain. It has exhibited resistant reaction against leaf and neck blasts (score 3-5), brown leaf spot (score 3-5), sheath rot (score 3), leaf scald (score 3), false smut (score 1) and also found tolerant to stem borer and leaf folder (score 1-3) under natural condition. It has semi-erect plant type, compact and well exerted panicle, awnless grain, semi-dwarf plant type, non-pigmented apiculus, green coloured leaf blade and leaf sheath, and erect flag leaf. This variety was found highly responsive to organic fertilizer when evaluated for lower (30 kg/ha), recommended (60kg/ha) and higher (90kg/ha) doses of nitrogen. It has excellent phenotypic acceptability, intermediate plant height (95-100cm) and non lodging plant, semi-erect panicle with high spikelet fertility and easy panicle threshability. It also contain excellent grain quality viz., hulling (82%), milling (77%), high head rice recovery (70%), kernel length 6.95mm; kernel breadth 2.09mm; L/B ratio 3.33mm. It has exhibited high alkali spread value (2.0) and intermediate amylose (25.17%) content.

These varieties have full potential to increase production and productivity of rainfed upland hill rice under organic condition and can show significant impact among the farmers by increasing total production of rainfed rice in the state.

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