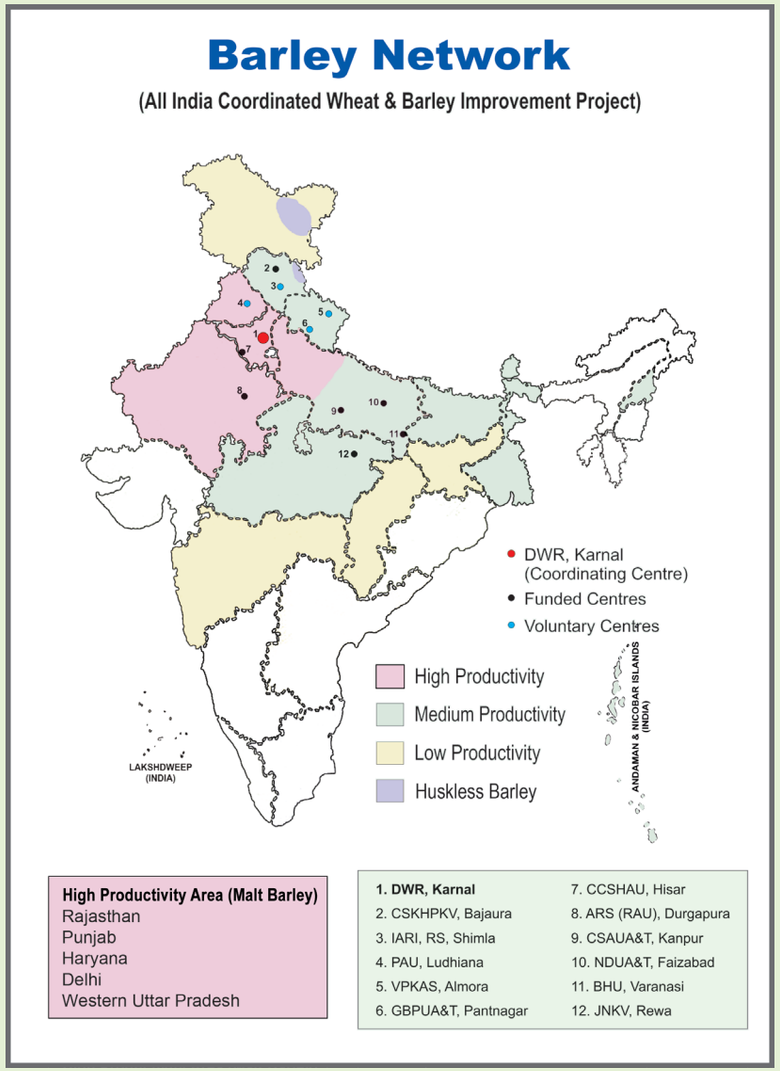
Analytical guidelines for malt barley varieties in India

Parameter	2-row	6-row
Grain Parameters		
Moisture (%)	<12.0	<12.0
Kernel Shape	Elliptical with major axis 2 to 2-½times to minor axis	
Kernel Size	Uniform plump	Uniform plump
on 2.5 mm Through 2.2 mm	90% <3%	80% <3%
Skinned/broken grains	<10%	<10%
1000 grain weight (g)	>45	>42
Husk Content	<11.0%	<11%
Protein Content (d.b.)	9.0-11%	9.0-11.5%
Germination Capacity	>96%	>96%
Germination Energy (72hrs)	>96%	>96%
Beta-glucan	<4.0%	<4.0%
Dormancy	Some amount of dormancy to avoid the pre-germination	
Malt Parameters		
Malt Modification	Satisfactory modification with four days germination cycle	
Malt Homogeneity Malt Friability	>90% >60%	>90% >60%
Total Protein (d.b.)Soluble Protein S/T/Ratio	5-6% 40-44%	5-6% 40-44%
Malt Extract (minimum)	80%	78%
Coarse v/s Fine difference	<3.0 %	<3.0 %
Wort Viscosity	<1.5	<1.5
Wort turbidity	Clear	Clear
Diastatic Power (^{0}L.V.)	90-110	90-120
Alpha Amylase	Equal to or greater than check	
Di-methyl Sulphide	20-30ppb	20-30ppb

**Finalized in first meeting of the "NATIONAL CORE GROUP ON MALT BARLEY DEVELOPMENT" at DWR, Karnal on 12 Dec., 1995 and revised during the annual workshop at IARI, New Delhi in August 2004.*



Recent malt barley varieties and management practices for north western plains of India

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Barley is an ancient cereal grain, which upon domestication has evolved from largely a food grain to a feed and malting grain. Barley is the world's fourth most important cereal crop after wheat, rice and maize. Barley is grown nearly by 100 countries worldwide and during 2011, the global area under the crop was nearly 48.60 million hectares with a production of 134.27 million tonnes. In India, area under the crop is concentrated mainly in the states of Rajasthan, Uttar Pradesh, Madhya Pradesh, Punjab, Haryana and Bihar etc. in plains and Himachal Pradesh, Uttarakhand and Jammu & Kashmir in the hills. During 2011-12, in India, barley occupied nearly 0.65 m ha area producing nearly 1.61 m tonnes grain, with a per hectare productivity of 24.8 q. Malt is the second largest use of barley and malt barley is grown as a cash crop in a number of developed and developing countries including India. Among cereals, barley is most preferred for malt, as its husk protecting the coleoptile (acrospire) during germination process and provides aid in filtration, firm texture of grains and its amylase activity makes it unique for malt recovery. Malt is used mostly in beer, whisky, malted milk and flavourings in a variety of foods. Barley malt can also be added to many food stuffs such as biscuits, bread, chocolates, cakes and desserts. The utilization of barley for malting and brewing industry has picked up recently with an increase of consumption of beer and other malt based products in many countries including India. In order to meet the required barley quantity as good quality raw material for their annual consumption, many of the private companies have initiated "Contract Farming" in different states with the new two-row cultivars released as malt type barley. The effect of different production factors viz. cultivar choice, planting date, planting density, fertilization, irrigation, weed management and availability of quality seed are the most important factors, and reflected in the yield and the malting quality of the crop. The recent high yielding malt barley varieties and their specific crop production practices and plant protection measures are given below -

Malt barley varieties and agro-ecological suitability

Variety	Year of release	Row pattern	Agro-ecological suitability
DWRUB 52	2007	Two-row	Irrigated, timely sown conditions of NWPZ*
RD 2668	2007	Two-row	Irrigated, timely sown conditions of NWPZ
DWRB 73	2011	Two-row	Irrigated, late sown conditions of NWPZ
DWRUB 64	2012	Six-row	Irrigated, late sown conditions of NWPZ
DWRB 91	2013	Two-row	Irrigated, late sown conditions of NWPZ

**NWPZ- North Western Plains Zone (states of Rajasthan, Punjab, Haryana, Delhi, Western Uttar Pradesh, Una district and Poanta valley of HP, Jammu and Kathua districts of J&K and Tarai regions of Uttrakhand)*

Major crop production and plant protection practices

Land preparation	Well drained, moderately fertile loam or light soil with plain topography and properly levelled.
Seed treatment	Carboxin 37.5 % + Thiram 37.5 % WS @ 3g /kg seed.
Sowing time	05-25 November (For irrigated, timely sown conditions) 01-20 December (For irrigated, late sown conditions).
Seed rate and sowing method	100 kg/ha, sowing either manually after opening furrows or by drill with 18 cm row to row distances.
Fertilizer doses & time of application	90 kg N: 30 kg P_2O_5: 20 kg K_2O (1/2 N and full dose of P and K as basal dose and remaining ½ N at the time of first irrigation as top dressing).
Irrigation schedule	First irrigation at active tillering (30-35 DAS), II at flag leaf stage (60-65 DAS) and III at the milking stage (85-90 DAS).
Weed Control	Pendimethilin (Stomp 30 EC) 3333-4950 g/ha* in 400-500 litres of water 2-3 days after sowing or Isoproturon (Arelon 75 WP) 1333 g/ha* or Pinaxaden (Axial 5 EC) 700-800 g/ha* at 30-35 days after sowing using 400-500 litres of water. **Product dose*
Major diseases and pest control	Yellow and brown rust and leaf blight- after appearance, one spray of Propiconazole 25EC (Tilt 25 EC) or Tebuconazole 250 EC (Folicur 250 EC) or Triademefon (Bayleton 25 WP) @ 200 ml of fungicide mixed with 200 litres of water should be sprayed in one acre crop. To control aphids apply Confidor (Imidacloprid 200 SL) @ 20g a.i./ha.
Harvesting	After proper maturity and before shattering of grains and brittleness of spikes nearly at 12-13% of moisture.


DWRUB 64


DWRB 91