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Recent trends in breeder seed production of barley (*Hordeum vulgare*) in India

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Barley (*Hordeum vulgare* L.) is considered world's fourth largest cereal crop after wheat, rice and maize (Baik and Ullrich 2008). It contributes nearly 7% in the global cereal production (Pal *et al.* 2012). Barley is an ancient cereal grain, which upon domestication has been evolved from largely a foodgrain to a feed and malting grain (Pourkheirandish and Komatsuda 2007). In India, barley is an important coarse cereal crop, being grown in *rabi* (winter) season in northern plains and hills. Area under the crop is mainly concentrated in the states namely, viz Rajasthan, Uttar Pradesh, Madhya Pradesh, Punjab, Haryana, and Bihar in plains and Himachal Pradesh, Uttarakhand and Jammu & Kashmir in the hills (Verma *et al.* 2011).

Agriculture continues to be the backbone of the people in India with the dependency of nearly 58% population for their livelihood. The prosperity of farmers and good crop production is firstly dependent on availability of good quality seed of adaptable modern varieties. Barley is also not an exception to this and in past unavailability of the good quality seed has been the bottleneck in spreading its cultivation. All India Coordinated Wheat & Barley Improvement Project (AICW&BIP) network plays an important role in this direction by organising the production of nucleus and breeder seed in the country, to ensure the sufficient quantity for further availability of foundation and certified seed.

A perusal of Fig 1 indicates that during 2005–06, a total of 851.61 q of barley breeder seed was produced against the DAC indent of 362.55 q (Anonymous 2006, Anonymous 2012). The indent and production trend both exhibited significant and continuous increase during 2006–07, 2007–08 and 2008–09, respectively (Anonymous 2007, Anonymous 2008, Anonymous 2009), and stabilised thereafter. The major rise in this demand came from Rajasthan and there was increase in barley cultivation leading the state to become number one producer of barley in India, replacing Uttar Pradesh. During 2009–10 and 2010–11, production trend was stable and a total of 3 052.52 q and 2 912.18 q breeder seed was produced against the indent of 2 464.50 q and 1 777.70 q, respectively. However, the production was higher over the indent and a surplus amount of 588.02 q and 1 134.48 q was produced, respectively. The number of indented varieties from 2005–06 to 2010–11 was approximately similar over the years and ranged from 22 to 36 with mean value of 30.

During 2008–09, 2009–10 and 2010–11, a consolidated breeder seed indents of 2 080.75 q, 2 464.50 q and 1 777.70 q, respectively were received from Department of Agriculture and Cooperation (DAC) for various feed and malt barley varieties (Anonymous 2009, Anonymous 2010, Anonymous 2011). During above three consecutive years the indent was received mainly from seven states namely, viz Rajasthan, Uttar Pradesh, Haryana, Punjab, Uttarakhand, Madhya Pradesh and Himachal Pradesh. The highest indent was employed by Rajasthan state as 71% (2008–09), 63.31% (2009–10) and 57.94% (2010–11), respectively, of the total indented quantity.

During 2008-09, the varieties namely, viz RD 2035 (410.60 q), RD 2052 (308.20 q), RD 2552 (262 q), RD 2668

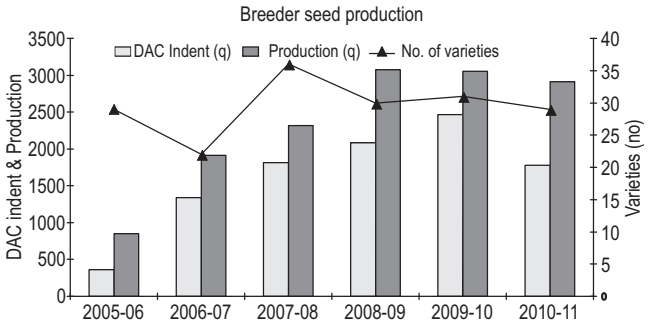

Fig 1 Barley breeder seed indent and production trend during last six years

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Table 1 Breeder seed production status of some high indented barley varieties during last three years

Varieties	Row release	Year of release	Released by	Use	2008–09		2009–10		2010–11	
					DAC Indent (q)	Production (q)	Indent (q)	Production (q)	Indent (q)	Production (q)
BH 393	6	2001	SVRC	Feed	68.15	70.00	86.40	141.00	51.10	62.50
BH 902	6	2009	CVRC	Feed					22.60	30.00
DWRUB 52*	2	2007	CVRC	Malt	20.00	25.00	20.00	24.00	60.00	60.00
K 409	6	1997	SVRC	Feed	1.00	4.00	61.00	40.05	61.00	48.00
K 508	6	1996	SVRC	Feed	20.00	15.20	35.00	24.00	40.00	50.00
K 551	6	1997	CVRC	Feed	15.00	30.00	10.00	10.00	10.00	32.00
NDB 1020	6	2001	SVRC	Feed	9.00	2.12	52.00	6.97	50.00	56.26
NDB 1173	6	2004	CVRC	Feed					20.00	11.73
NDB 209	6	1999	SVRC	Feed	9.00	1.10	52.00	4.80	50.00	62.00
NDB 940	6	1999	SVRC	Feed	10.00	28.25	83.00	42.35	91.00	71.5
PL 426	6	1995	SVRC	Feed	141.84	100.00	140.70	70.00	122.30	125.00
RD 2035	6	1994	CVRC	Feed	410.60	450.00	521.00	600.00	357.50	1013.00
RD 2052	6	1987	SVRC	Feed	308.20	500.00	141.20	185.00	95.60	207.84
RD 2552	6	1999	CVRC	Feed	262.00	500.00	418.10	982.00	315.30	519.14
RD 2592	6	2003	SVRC	Feed	153.00	275.00	250.00	315.00	150.00	264.73
RD 2624	6	2003	CVRC	Feed	100.40	195.00	50.00	7.00	60.00	68.80
RD 2660	6	2006	CVRC	Feed	105.80	107.00	153.00	182.00	86.00	63.30
RD 2668	2	2007	CVRC	Malt	156.00	15.00	179.50	278.00	86.20	120.26
RD 2715	6	2008	CVRC	Dual			62.00		25.00	28.25

*The breeder seed was produced for M/s UB Ltd, Bangalore and HSDC, Haryana.

(156 q), RD 2592 (153 q), PL 426 (141.84 q), RD 2508 (107.60 q), RD 2660 (105.80 q) and RD 2624 (100.40 q) were more popular amongst the farmers and were indented in higher quantities (Table 1). In terms of actual production, it was revealed that varieties, viz. RD 2552 (238 q) followed by RD 2052 (191.80 q), RD 2592 (122 q), RD 2624 (94.60 q) etc. were produced in surplus amounts against the indented quantities and a surplus quantity of 997.04 q was produced against the placed indent for different varieties.

During 2009-10 and 2010–11, the surplus quantity 588.02 q and 1 134.48 q of barley breeder seed was produced against the placed indent for 31 and 29 varieties, respectively. The varieties, viz. RD 2035 (521 q), RD 2552 (418.10 q), RD 2592 (250 q), RD 2668 (179.50 q), RD 2660 (153 q), RD 2052 (141.20 q) and PL 426 (140.70 q) were indented in higher quantities during 2009–10 (Table 1). While, during 2010–11, the varieties, viz RD 2035 (357.50 q), RD 2552 (315.30 q), RD 2592 (150 q), PL 426 (122.30 q), RD 2052 (95.60 q), NDB 940 (91 q) were indented in higher quantities. In general, the varieties, viz RD 2035, RD 2552, RD 2592, RD 2052 and PL 426 were indented well during both the consecutive years. It was also exhibited that during 2009–10, varieties, viz RD 2552 (563.90 q) followed by RD 2668 (98.50 q), RD 2035 (79 q), RD 2592 (65 q), BH 393 (54.60 q) etc. were produced in surplus quantities. During 2010–11, the highest indent was employed by Rajasthan state (1030 q) followed by Uttar Pradesh (400 q). The varieties, viz RD 2035 followed by RD 2552, RD 2592, RD 2052 and K 551 etc. were produced in surplus amounts against the indented quantities.

The annual requirement of barley for malting purposes is on continuous rise in recent years (Verma *et al.* 2011). The 20 to 25 per cent of barley is used for malting purposes in India, while the rest is utilized as feed grain and very little quantity is utilized as food. Many of the private companies have initiated "Contract Farming" to meet their raw material requirement in different states. DWRUB 52 is a fine example of this and breeder seed in the quantities of 25 q (2008–09), 24 q (2009–10) and 60 q (2010–11), respectively was produced and supplied to M/s UB Ltd, Bangalore and HSDC, Haryana (Table 1) to fulfil their demand for the variety in Punjab, Haryana and Rajasthan.

SUMMARY

The indent and production trends both indicated, that during last decade there was nearly six fold increase in indent and more than three times increase in production for barley breeder seed. The number of varieties in breeder seed production programme remained almost similar with mean value of 30. Most of the highly indented varieties, i e RD 2035, RD 2552, RD 2592, RD 2052, PL 426 and K 551 etc. in breeder seed chain are six-row type feed barley. DWRUB 52 and RD 2668 (both two-row) are malt type, while RD 2715 (six-row) is dual purpose barley, respectively. It is

expected that in future newly released malt barley varieties as RD 2668 and DWRUB 52 (both timely sown) and DWRB 73 and DWRUB 64 (both late sown) will find higher places in indent due to their better suitability under areas with scanty rainfall as well as delayed sowings in other than rice-wheat crop rotations, in north western plains. It has been also observed that because of severe drought in the drier parts of northern plains, there is an acute shortage of green forage in the months of November to January. The dual purpose barley can be a better option as green forage and grain crop in dry areas. Dual purpose barley varieties BHS 380 and RD 2715 can prove boon for farmers of northern hills and plains. It is expected, these will be indented in higher quantities in future. In upcoming years newly released barley varieties as HBL 391, PRB 502, BH 902, PL 751, JB 110, UPB 1008, BHS 380, RD 2715, RD 2668, DWRUB 52, DWRB 73, DWRUB 64 etc. will be more popularized and will find still higher places in indents. These newly released high yielding varieties are more tolerant to diseases particularly cereal rusts and leaf blights, which will certainly help in raising the yield levels and will be more remunerative to farmers.

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