



Short communication

## RD 2592 — A new high yielding barley (*Hordeum vulgare* L.) variety to sustain maximum production in warmer areas of Rajasthan

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(Received: December 2004; Revised: July 2005; Accepted: August 2005)

Barley (*Hordeum vulgare* L.) is an important *rabi* cereal next to wheat, in acreage and production in Rajasthan, which is reflected by decade average of area, production and productivity of barley in the state. In Rajasthan, it is grown over an area of about 1.92 lac hectares with an annual production of 4.47 lac tones resulting an average yield of 23.29 q/ha [1]. It is widely grown due to its increased demand as well as lower cost of cultivation. It has great elasticity of adaptation under various stresses and lot of potential both for domestic and industrial uses (production of malt, which is used in breweries to make beer, industrial alcohol, whisky, malt syrups, malted milk and vinegar). Its multifarious uses and ability to grow under adverse conditions have attracted farmers of non- traditional areas of Rajasthan for cultivation. Thus, this crop needs to be promoted as an industrial crop for malting and feed industry of domestic market for better returns to marginal/sub-marginal farmers of the state [2]. Barley is generally grown under marginal lands, problematic soils and temperature stress conditions. Its grain is used for food, feed and malting in Rajasthan. Ten to fifteen per cent production of barley from the state goes to the industries for manufacturing beer, alcohol, whisky, malt enriched food and malt syrup. Due to importance of this crop for industrial uses as well as in feed industries, there is an urgent need to give proper attention for the development of new high yielding varieties / hybrids to promote the cultivation of this crop. Hence, in Rajasthan there is need to develop a new set of varieties to sustain the maximum production under various agro-climatic situations.

Generally barley growing season is very short in Rajasthan, hence, the barley varieties, which have early/medium maturity, possesses adequate heat tolerance along with resistance to biotic and abiotic are required.. In this endeavour, RD 2592 was developed from two genetically diverse genotypes through single cross (RD 2503/UBL 9) followed by pedigree selection. The parent RD 2503 was selected because it had tremendous potential to withstand temperatures higher than 35°C and used as source of high temperature tolerance in breeding program aiming at high yielding

varieties for hotter environments. On the basis of various developmental traits like medium maturity, high tillering, high number of spikelet per spike, high number of grains per spike, 1000-grain weight, high biomass, grain yield per plant, reaction to important disease and grain quality parameters, the most promising, homozygous line was screened out and named RD 2592. This variety is suitable for normal sown, high fertility irrigated conditions. This is suitable for all types of the soils available in the state except saline/alkaline. It is also suitable for the Cereal cyst nematode (CCN) infested problematic soils of the state. This variety has light green erect plant, profuse tillering, waxy leaves, non-waxy long ears and light yellow grain. It is non-lodging and non-shattering variety and suitable for normal sowing conditions under high fertility irrigated conditions for the warmer areas of Rajasthan because it is genetically blessed better thermo tolerance mechanism to thrive well under hotter environments.

The variety RD 2592 gave consistently marginally higher grain yield over popular varieties at various locations of the state, indicated good adaptability and stability for higher grain yield (Tables 1 and 2). The variety showed response to higher dose of nitrogen and it gave average 10.60% and 7.25% higher grain yield over RD 2552 and Jyoti check varieties in coordinated agronomy trials. The variety has better straw strength (resistant to lodging) and medium threshability. To harvest good levels of yield four irrigations are required under warmer condition of Rajasthan. The variety RD 2592 showed better yield

**Table 1.** Mean performance of feed barley variety RD 2592 in coordinated trials in North western plains zone of India

| Variety     | Yield (q/ha) |           |         | Mean Yield (q/ha) |
|-------------|--------------|-----------|---------|-------------------|
|             | 1998-99      | 1999-2000 | 2000-01 |                   |
| RD 2592     | 46.9         | 45.8      | 43.2    | 45.3              |
| RD 2035 (C) | 43.9         | 43.6      | 42.0    | 43.2              |
| RD 2552 (C) | -            | 46.1      | 46.1    | 46.1              |
| Jyoti (C)   | 40.3         | 42.2      | 38.9    | 40.5              |
| C. D. at 5% | 2.8          | 1.7       | 1.7     |                   |

**Table 2.** Performance of feed barley variety RD 2592 in coordinated trials at various locations of Rajasthan

| Variety     | Yield (q/ha) |            |        |            |        |                |          | Mean Yield (q/ha) |
|-------------|--------------|------------|--------|------------|--------|----------------|----------|-------------------|
|             | 1998-99      | 1999-2000  |        |            |        | 2000-2001      |          |                   |
|             | Durga pura   | Durga pura | Tabiji | Durga pura | Tabiji | Sriganaganagar | Navga on |                   |
| RD 2592     | 50.1         | 42.5       | 39.1   | 41.0       | 29.3   | 44.2           | 58.8     | 43.6              |
| RD 2035 (C) | 51.6         | 38.7       | 39.9   | 40.1       | 30.4   | 49.0           | 46.4     | 42.3              |
| RD 2552 (C) | -            | 37.9       | 47.1   | 37.9       | 32.6   | 48.8           | 67.9     | 45.4              |
| Jyoti (C)   | 48.9         | 37.5       | 43.7   | 36.3       | 27.7   | 37.4           | 53.0     | 40.6              |
| GM          | 46.6         | 39.5       | 39.5   | 37.3       | 30.0   | 41.5           | 57.3     |                   |
| CD 5%       | 4.3          | 4.4        | 2.3    | 3.9        | 3.9    | 2.3            | 8.4      |                   |

**Table 3.** Response of feed barley variety RD 2592 against yellow and brown rusts and CCN in Initial barley rust screening nursery (IBRSN) and National barley disease screening nursery (NBDSN)

| Variety     | Yellow rust |             |              | Brown rust |         | Cereal cyst nematode |         |          |
|-------------|-------------|-------------|--------------|------------|---------|----------------------|---------|----------|
|             | I year      | II year     | III year     | I year     | II year | I year               | II year | III year |
| RD 2592     | 0.0         | 0.0         | 10MS (1.6)   | 0.0        | 0.0     | R                    | MR      | MR       |
| RD 2035 (C) | 100S (60.0) | 100S (56.7) | 65S (21.4)   | 40S        | 50S     | R                    | R       | R        |
| RD 2552 (C) | 10S (3.0)   | 0.0         | 20MS-S (3.6) | 30S        | 20S     | S                    | S       | S        |
| Jyoti (C)   | 65S (37.0)  | 80S (57.5)  | 100S (38.4)  | 60S        | 60S     | S                    | S       | S        |

In parenthesis: Average coefficient of infection; I year-1998-99, II year-1999-2000, III year-2000-01

performance in adaptive trial at Adaptive trial centre, Ajmer and gave 6.03%, 7.04% and 13.31% higher grain yield over check varieties RD 2035, RD 2552 and Jyoti, respectively. RD 2592 variety performed well in demonstrations conducted at Agricultural research sub station, Tabiji, Ajmer and Krishi Vigyan Kendra, Jhunjhunu. It gave 8.8% and 11.96% higher grain yield over popular varieties RD 2035 and RD 2552, respectively. Similarly, this variety gave 23.5% higher grain yield over local varieties in on farm demonstrations at farmer's fields. These results confirmed that this variety has stability and sustainability of production under various environmental conditions.

Results of agronomic attributes of RD 2592 exhibited that it flowered in 72-87 days and attained maturity in 117-131 days. It has plant height 85-115 cm. It produced 95-116 tillers/m<sup>2</sup> and straw strength ranged from 2-4. It also possesses light yellow grain with the average 38-46 g test weight under warmer areas, which provided extra bonus to barley growers in the domestic market. This variety has consistently sown high degree of resistance against yellow and brown rusts and also showed moderately resistance to Cereal cyst nematode (Table 3). Hence, it could offer good opportunity for sustainable barley production in the state. The variety has inbuilt mechanism for higher

yield, rust resistance and other desirable traits viz., medium maturity, good plant height and straw strength, profuse tillering and higher grain weight, which offered a promise to increase production and productivity of barley in the state.

The popular barley variety RD 2035 has no resistance genes to yellow and brown rusts; thereby it is highly susceptible to rusts. Therefore, to overcome the threat of rust epidemic in the state, there is need to replace RD 2035 from cultivation through a newly developed high yielding and rust resistant variety like RD 2592. Besides this, RD 2592 is moderately resistant to cereal cyst nematode; hence, harvesting good yield in CCN infested areas can benefit the farmers. In

February 2004, the Central Sub-committee on Crop Standards, notification and release of varieties for agricultural crops, notified this variety for timely sown, high fertility, irrigated condition of Rajasthan. Medium maturity coupled with higher grain weight under heat stress environment is an inheriting beauty of the RD 2592, which could be helpful to alleviate the barley production under warmer areas of the Rajasthan.

Genetically this variety is blessed with inheriting mechanism, which would permit manipulation of higher biomass and yield potential, while heat tolerance would protect that yield from being eroded. The genetic and physiological basis of heat tolerance in this variety made it suitable for cultivation under various cropping sequences to harvest higher barley yield and also to enhance profitability of marginal / sub marginal farmers of Rajasthan. Hence, this high yielding barley variety could play a pivotal role in upward swing in the state barley grain production and productivity in the coming years.

## References

1. **Jag Shoran.** 2004. Report of the Project Director (Wheat) for the year 2003-2004. AICW & BIP, DWR, Karnal.
2. **Verma R. P. S.** 2004. Progress Report 2003-2004, Crop Improvement Programme. AICW & BIP, DWR, Karnal.