Table 2. Area, production and productivity of blackgram in Maharashtra

Year	Area (thousand ha)	Production (thousand tons)	Productivity kg/ha
1989	513.0	215.0	419.0
1999	546.0	344.4	631.0
Increase (%)	6.4	60.2	50.6

Source: The Economics and Statistical Survey of India, Ministry of Agriculture, Govt. of India.

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AN EARLY MATURING RICE MUTANT RELEASED AS A VARIETY

In the content of food grain production deficiency (about 1.0 – 1.5 million tons of rice per year according to the Bangladesh Bureau of Statistics, 1998) an induced mutation programme was undertaken in 1985. One moderate early maturing and high yielding rice mutant line (BINA6-84-4-115) has been developed by irradiating F_2 seeds of the cross 'BR4' x 'Iratom 38'. Three treatments viz., 250, 300 and 350 Gy were given to the F_2 seeds. Finally, this line was selected in M_6 generation for advanced yield trial. The line was evaluated in comparative trials with another mutant line BINA6-84-4-163. These two mutant lines had been selected earlier from 300 Gy originated lines. The two check varieties, 'BR 11' and 'BR 22' were also included in the trial, which was conducted in two consecutive T. aman seasons (July to December) during 1994 and 1995 at five locations in Bangladesh.

From the results, it was evident that the mutant BINA6-84-4-115 did not differ much with the other mutant lines or check varieties in respect to plant height, number of effective tillers and panicle length but it was 10-18 days earlier than the other 3 entries (Table 1). It produced a similar yield as the check BR 11 in 1994 and a higher yield than the check BR 11 and BR 22 in 1995. This mutant line gave the highest yield per day among all the entries (Table 2). In addition to this, the grains are long, fine and possess a high L/B ratio, which are of high commercial value. This line has been released by the National Seed Board of Bangladesh in 1998 as a commercial variety under the name "BINADHAN-4" for cultivation throughout Bangladesh.

Table 1. Some important traits of BINA6-84-4-115 (BINADHAN-4) compared to two check varieties

Variety/line	Plant height (cm)	No. of effective tillers	Panicle length (cm)	No. of grains/panicle	Days to maturity	1000-grain wt. (g)	Grain length (mm)	Grain breadth (mm)	L/B ratio
BINA6-84-4-115	117	9.0	25.6	118	130	24.60	9.9	2.85	3.47
BINA6-84-4-163	108	9.1	25.5	116	140	25.65	7.9	2.70	2.93
BR 11 (check)	116	9.2	24.0	122	138	24.53	8.0	2.75	2.91
BR 22 (check)	118	9.7	27.0	137	148	20.02	7.9	2.40	3.29

Table 2. Grain yield performance of BINA6-84-4-115 (BINADHAN-4) compared to two check varieties

Variety/line	Grain yield (kg/ha)		Average yield (kg/ha)	Average yield/day (kg/ha)
	1994	1995		
BINA6-84-4-115	4897b	4670b	4783.5b	36.80
BINA6-84-4-163	5140a	4882a	5011.0a	35.79
BR 11 (check)	4990b	4619c	48.4.5b	34.81
BR 22 (check)	5094a	4555d	4824.5b	32.59

Same letters in a column did not differ significantly at 5% level

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INDUCTION OF RESISTANCE TO BLAST DISEASE IN AN ELITE RICE CULTIVAR 'IR 50'

One of the most promising techniques for producing disease resistant forms of plants is the use of mutagenic agents. It has been demonstrated by several workers that genetic variability for several desired characters can be induced successfully through mutations and its practical value in plant improvement programmes has been well established. The main advantage of mutation breeding is the possibility of improving one or two characters without changing the rest of the genotype.

The elite cultivar, 'IR 50' (IR 2153-14-1-6-2/IR 28//IR 36) was developed at IRRI, Los Banos, The Philippines and was released in India for the State of Tamil Nadu in 1982. It is highly responsive to fertilizer, records high yields and possesses good grain characters. It matured in just more than 100 days and was ideal for both samba and navarai seasons in Tamil Nadu. But, the cultivar was shown to be highly susceptible to blast (causative organism *Magnaportha grisea*) causing extensive losses year after year. With the objective of developing high yielding, blast tolerant mutant lines from IR 50, the mutation approach was adopted and both physical (gamma-rays from ^{60}Co) and chemical mutagens (EMS - ethyl methanesulphonate and sodium azide) were employed on dry seeds. The M_1 generation was grown in closely spaced plants. One hundred and sixty-eight derived families were grown in M_2. In M_3 generation, 128 M_3 families were further selected for evaluation in M_4 and M_5. Based on evaluation of yield and other attributes, a total of 85 mutants were finally selected and evaluated for their stability. In selection of the mutants, it was ensured that all the selected mutants resemble the parent for both agronomic and quality characteristics.

The evaluation of these mutant lines for the level of tolerance to blast disease was conducted at CRRI over a number of years under both artificial and natural conditions. These mutant lines showed varied levels of tolerance to blast in comparison to total susceptibility of