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

the parent to the disease. The mutants were tested at different 'hot spot' locations of blast like Hazaribag in Bihar, Maruteru in Andhra Pradesh and Jagdalpur in Madhya Pradesh. In addition, they were also screened under greenhouse conditions at the Directorate of Rice Research, Hyderabad. Experimental data from all these centers support the earlier finding that variation for tolerance to blast exist in these mutant lines.

The relatively highly tolerant mutant lines were further evaluated under artificial screening at CRRI and highly tolerant individual plants with individual scores of 1 and 2 as against the parent variety score of 7 to 9 (in the IRRI disease score scale of 1 to 9) were selected. After seed multiplication, yield evaluation trials were conducted on fourteen different individual plant derived lines. The field evaluation data on the selected fourteen mutant lines i.e. CRM 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54 and 58) indicate that all these mutant lines yielded either at par or higher than the parent.

The mutants were further tested for their suitability in the replacement of the parent variety in the State of Assam. In the yield evaluation and adaptation trials conducted at Kokilabari Farm, Assam, the mutants performed consistently with a yield of over 3 t/ha. Further evaluation of CRM mutant lines over a four year period at Regional Agricultural Research Station, Assam Agricultural University, Diphu, Assam revealed that three mutant selections, i.e. CRM 49, 51 and 53, consistently yielded double that of the parent (2.5t/ha in comparison to 1.25t/ha for parent). Further, in the trials conducted at Zonal Agricultural Research Station of Indira Gandhi Krishi Viswa Vidyalaya, Jagdalpur, the CRM mutants performed well for both yield and the disease scores. Based on the performance of these mutants, the Government of Assam is proposing the release of three mutants namely, CRM 49, 51 and 53 and wishes to replace the parent cultivar IR 50 with these high yielding and blast tolerant mutants.

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INDUCTION OF DROUGHT TOLERANT MUTANTS OF RICE

The ultimate goal of crop breeding is to develop varieties with a high yield potential and desirable agronomic characteristics. In Egypt, the most important qualities sought by breeders have been high yield potential, resistance to major diseases and insects, and improved grain and eating quality. However, breeding efforts should concentrate on varieties with the potential to minimize yield losses under unfavorable conditions such as drought, and to maximize yields when conditions are favorable. Rice (*Oryza sativa* L.) in Egypt is completely irrigated and a significant portion of the rice cultivated area is subject to water deficit resulting from an inadequate or insufficient irrigation supply. Drought tolerance is a complex trait in that it results from the interaction of histological and physiological characters of plant with environmental factors, both above-ground and under-ground [2]. Accordingly, root characters are closely related to drought tolerance. Little attention has been paid in Egyptian breeding programs to root characters and their relation to shoot characters. Furthermore, induced mutations are considered as one of the most important methods to induce useful mutants, especially with improved root characters, to overcome the drought problem. The present investigation aimed to study the effect of different doses of gamma rays on several characters of three Egyptian rice varieties, i.e. 'Giza 171', 'Giza 175' and 'Giza 176' and to induce one or more mutants possessing drought tolerance.