RESEARCH NOTE

NEW CHILLI VARIETY "MI-HOT"

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INTRODUCTION

Four chilli varieties (MI-1, MI-2, KA-2 and Arunalu) have been recommended by the Department of Agriculture for general cultivation. The yield potential of these varieties range from about 3-5 t/ha under well-managed conditions, but under farmer field conditions yield is only about 1 t/ha. The main reason for the low yield is these varieties are not resistant to major biotic and abiotic stresses. Variety MI-2 is the most popular variety as it has a wide adaptability, but it is susceptible to anthracnose and choanephora blight diseases. It is moderately susceptible to Leaf Curl Complex (LCC) and storability is poor. Variety KA-2, has a high level of resistance to LCC at early growth stages, but is susceptible at latter growth stages. It is also susceptible to anthracnose disease. High percentage of discoloured pods during drying, poor storability in general and colour changes of dry pods within a short period of about 4 months storage are some of the undesirable characteristics of KA-2. Variety Arunalu is easy to dry and is moderately resistant to anthracnose and drought, but is susceptible to LCC. Keeping quality is good and can be stored for about 7 months without pod discolouration. However, harvesting of pods is difficult because of the upward fruiting habit.

Hence, the main objectives of the chilli crop improvement programme for several years have been to incorporate into good quality varieties tolerance to major pests and diseases (LCC, anthracnose, choanephora blight). However, to combine all these traits into a single cultivar is difficult, but efforts were made to incorporate at least the important characters using parents with multiple favourable characters and a new chilli variety MI-Hot was developed at the Field Crop Research and Development Institute, Maha Illuppallama.

ORIGIN

MI-Hot was developed from a three way cross of (BL39 x IR) x KA-2. Variety IR has high level of tolerance to LCC, (Perera, *et al.* 1996) drought and choanephora blight (Perera, *et al.* 1996; 1997). However, this variety has very low pungency. Variety BL-39 (Arunalu) was used to incorporate anthracnose tolerance and good pod quality characters such as easy drying, high pungency, and keeping quality. Variety KA-2 was used to introduce early tolerance to LCC and high pungency. Initial crossing was made in 1993. Pedigree method of breeding was followed. Segregating populations were evaluated

with minimum insecticide usage (1-3 spraying) and no fungicides. Single plant selections were made based on pod number, concentrated fruit set, fruit size, colour, pungency and field tolerance to LCC, choanephora blight, and anthracnose. Self seeds of selected individuals were used to bring the subsequent generation as progeny rows. In F 7 generation, 120 breeding lines were selected and Preliminary Yield Trials (PYT) were conducted with 2 replicates. Also dry pods of each breeding line were packed in polysack bags and kept under ambient temperature to test storability. Storability was determined by time taken for discoloration and fungal infection of pods. Based on yield, pest and disease tolerance, pod quality and keeping quality, 60 lines were selected for Advanced Yield Trials and evaluated under irrigated and rainfed conditions. Twenty lines were selected based on plant survival, growth, pod setting and yield under both conditions.

PERFORMANCE

The 20 selected breeding lines were thereafter extensively evaluated along with 2 recommended varieties, MI-2 and Arunalu, in the National Coordinated Varietal Trials (NCVT) programme at different Regional Agricultural Research Centres in the major chilli growing areas during the years 2000-2002. Experiments were conducted using randomised complete block design with 4 replicates during *maha* and *yala* seasons. Varieties that did not perform well were removed in subsequent years/seasons of testing. In most locations and seasons, four breeding lines (DC 98171, DC 98471, DC 9874 and DC 985-3) were found to consistently produce yields which were significantly higher or comparable to those of MI-2 and Arunalu, (Table 1). Stability of the varieties were determined using the method described by Das (1982). Variety DC 98171, had the highest mean yield (1.96 t/ha) and mean score value (4.7t/ha) with lowest variance (0.97), thus showing, that the variety is adaptable to different agro climatic regions (Table 2). The 20 breeding lines were also evaluated along with the 3 recommended varieties (MI-2, KA-2 and Arunalu) during maha 2000/2001 and *maha* 2001/2002 for resistance to *Colletotrichum capsici*, the causal agent for anthracnose disease, under field conditions by spraying conedia suspension (5 x 105 conidia/ml of water) on to the plants. During *maha* 2000/2001, weather conditions were favourable for disease development, and disease incidence varied from 25-67% among the varieties. Line DC 98171 recorded significantly low incidence of anthracnose (25%) than MI-2 (59%) and KA-2 (68%) and Arunalu (42%) (Priyantha, *et al.* 2000). Storability test carried out with the 20 breeding lines and the 3 recommended varieties revealed that 6 new breeding lines including DC 98171 and Arunalu had no distinguishable colour change after 6 months of storage where as colour of KA-2 and MI-2 turned dull-red with fungal growth inside the pods after 4 months of storage.

Considering yield, fruit quality, storability and tolerance to anthracnose, breeding lines DC 98171, DC 9874 and DC 985-3 were selected for farmer adaptability trials. These 3 lines were evaluated together with MI-2 and Arunalu in farmer fields in 6 locations in the Anuradhapura district and 2 locations in Hambantota district for 2 seasons. Varieties DC 98171 and DC9874 gave yield increases of 62.5% and 56% respectively over Arunalu, and 24% and 19% respectively over MI-2. Yields were similar in the two new breeding lines. However,

Table 1. Dry chilli yield of new breeding lines and recommended varieties (MI-2 and Arunalu) in NCVT programme.

Breeding line/ Variety	Dry chilli yield (tha-1)												
	2000 *yala*			2000/2001 *maha*				2001 *yala*			2001/2002 *maha*		
	MI	ANK	ARL	MI	ANK	VAU	MON	MI	ANK	WRW	MI (irrigated)	MI (rainfed)	MON
DC 98171	3.3 a	1.5 a	2.4 ab	1.5 ab	1.0 ab	3.7 ab	1.8 ab	1.7 ab	1.4 a	1.0 a	2.5 a	2.4 ab	1.3 a
MI-2	3.1 ab	1.0 ab	1.4 b	1.1 de	0.6 c	3.0 abcde	1.8 ab	1.3 def	0.6 f	0.6 cde	1.6 cd	1.9 bc	0.8 b
DC 985-3	2.8 abc	1.1 ab	2.0 ab	1.5 ab	0.5 c	2.0g	2.3 a	1.6 abcd	1.1 bc	0.8 bc	1.9 bc	1.8 c	1.1 ab
DC 98161	2.7abc	1.2 ab	1.9 ab	1.3 bcde	0.5 c	2.5 efg	1.6 ab	1.3 cdef	1.3 ab	0.9 ab	2.0 bc	1.5 c	1.1 ab
DC 98471	2.9 abc	0.9 b	1.9 ab	1.7 a	0.9 abc	3.6 abc	1.9 ab	1.6 abc	0.8 def	0.6 cde	2.5 a	1.9 bc	1.3 a
ARUNALUc	2.6 abc	0.9 b	1.2 b	1.1 ab	0.6 c	2.1 fg	1.3 b	0.9 g	0.6 f	0.6 cde	1.4 d	1.6 ab	1.1 ab
DC 9874c	2.5 abc	1.1 ab	1.8 ab	1.2 bcde	1.1 a	3.8 a	1.6 ab	1.8 a	1.0 cd	0.6 cde	2.2 ab	2.4 a	0.9 ab
DC 98144	3.0 abc	1.1 ab	1.4 b	1.4 abcd	0.6 bc	2.9 cdef	1.8 ab	1.2 ef	0.7 f	0.6 cde			
DC 9840 b	2.8 abc	1.0 b	1.7 ab	1.4 abcde	0.8 abc	3.7 ab	1.9 ab	1.3 cdef	0.6 f	0.5 de			
DC 98214	2.8 abc	1.0ab	1.9 ab	1.2 bcde	0.6 bc	3.0 bcde	1.7 ab	1.5 bcdef	0.9 cde	0.7 cd			
DC 9815 b	2.8 abc	1.0 b	1.9 ab	1.4 abc	0.7 bc	2.6 defg	1.5 ab	1.4 bcdef	0.8 def	0.6 cde			
DC 9833 b	2.7 ab	1.1 ab	1.2 b	1.4 abc	1.0 ab	3.4 abcd	1.7 ab	1.4 bcdef	0.7 f	0.5 de			
DC 98151	2.4 abc	0.7 b	1.7 ab	1.0 e	0.7 bc	3.4 abcd	1.8 ab	1.5 bcde	0.7 ef	0.6 cde			
DC 987 b	2.1 c	0.8 b	1.4 b	1.2 bcde	0.6 abc	3.4 abcd	1.7 ab	1.4 bcdef	0.7 f	0.5 de			
DC 9811 b	2.6 abc	0.8 b	2.4 ab										
DC 9820 b	2.6 abc	1.1 ab	1.7 ab										
DC 98223	2.4 abc	0.9 b	2.7 a										
DC 9817 b	2.3 bc	1.0 b	2.2 ab										
DC 9875	2.3 abc	0.9 b	1.8 ab										
DC 9827 b	2.2 c	0.8 b	1.3 b										

ANK – Angunakolapelessa; ARL – Aralganwila; MI – Maha Illuppallama; MON – Moneragala; VAU – Vauniya; WRW -

Table 2. Mean yield, mean score and variance of score of 14 breeding lines based NCVT results

Breeding line/Variety	Mean yield (tha-1)	Mean score	Variance of score
DC 98171	1.96	4.73	0.07
MI-2	1.45	2.92	2.08
DC 985-3	1.58	3.59	1.24
DC 98161	1.52	3.50	1.67
DC 98471	1.73	3.81	1.44
ARUNALU	1.23	3.08	2.96
DC 9874	1.69	4.00	1.08
DC 98144	1.47	2.95	2.47
DC 9840 b	1.57	3.05	2.64
DC 98214	1.53	3.26	1.10
DC 9815 b	1.47	3.16	2.20
DC 9833 b	1.51	3.21	1.87
DC 98151	1.45	3.06	2.34

farmers preferred DC 98171 over DC 9874 as the number of discoloured pods produced during drying was negligible. Also the colour of dry chilli and keeping quality was better than MI-2. In addition, farmers preferred DC 98171 over Arunalu due to the pendant shaped fruits and easy harvesting.This variety named "MI-Hot" was accepted by the Variety Releasing Committee in 2001 and released for general cultivation. Breeder seeds of this variety are available at FCRDI, MI for seed multiplication programmes.

Description of the Variety DC 98171 (MI-Hot)

Growth habit is compact and the average height is 55 cm and 50 cm during *maha* and *yala* seasons respectively. Plants show an intermediate branching habit and flowers are borne singly at the node with white corolla. Plants reach 50% flowering in about 70 days after sowing (DAS) during *yala* and 96 DAS during *maha*. First harvest can be taken at 107 and 120 DAS during *yala* and 96 DAS during *maha*, respectively. Duration of the crop is 5½ - 6 months. Fruits are pendant shaped, elongated and green in colour at green-mature stages and red in colour at full maturity. Fruits have an average length of 6.5-7.0 cm, width of 1.0-1.5 cm, and have a slightly corrugated surface. The variety is moderately pungent and suitable for both green and dry chilli production. Storability of dry chilli is good with a storage life of about 6 months without any colour change. Average yield is over 3.5 t/ha dry chilli under irrigated condition. The variety is adapted to rainfed situations too and has the potential to produce about 2 t/ha dry chilli during *maha* when rainfall is well distributed. It is moderately resistant to anthracnose disease and has field tolerance to choanephora blight and cercospora leaf spot diseases.

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REFERENCES

Das, G.R. 1982. A method of scoring yield status for selecting rice varieties. Indian J. Agric. Sci.52(4):207-209.

Perera, K.D.A., S.J. Arasakesari, and G.D.S.N. Chandrasene, 1996. Evaluation of chilli (*Capasicum spp.*) Germplasm for resistance to thrips. The present status and future prospects of plant genetic resources conservation and utilization. In Proceedings of seminar held in Kandy, Sri Laka. 9-12 December 1996. pp. 131-138.

Perera, K.D.A., S.J. Arasakesari, and W.M.C.J.K. Chandrarathna, 1997. Variety evaluation of chilli under rainfed situation. Annual Research Report 1997. Field Crops Research and Development Institute, Department of Agriculture, Maha Illuppallama. pp. 9-13.

Priyantha, M.G.D.L., D.R. Yapa, and A. Ranasinghe, 2001. Screening of chilli germplasm for resistance to anthracnose. Annual Research Report 2001. Field Crops Research and Development Institute, Department of Agriculture, Maha Illuppallama. pp. 15-17.

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