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Effect of Exposures to subfreezing temperature on the survival and subsequent growth of *Eleusine indica* (L.) Gaertn.

Eleusine indica (L.) Gaertn. is a common way-side weed throughout the tropics and also occurs as an adventive on rubbish dumps at ports and docks as far north as British Isles and as far south as New Zealand[12]. Its occurrence in temperate countries suggests that the species would be quite resistant to freezing temperature and frost. In tropical regions, such as upper Gangetic Plain, during winter season severe frosts are occasional when the night temperature drops to near freezing. Therefore, the influence of repeated exposures to subfreezing temperature (−10°C) on the growth of this plant was evaluated and the same is reported here.

Fifteen-day old seedlings were transplanted in small earthenware pots in April and, after establishment, they were subjected to exposures of −10°C in a deep freeze for 6 days for the following durations: (1) 0.5 hr./day, (2) 1 hr./day, (3) 1.5 hr./day and (4) 2 hr./day. The 'control' seedlings were maintained at 38°C in a glass-house where the treated ones were also kept after low temperature exposures. For each treatment 15 seedlings maintained in 5 pots under uniform condition of watering were used. After a recovery period of 17 days, final observations were recorded. Thus, the standard procedure for measuring frost hardiness[4] was followed with the exception that emphasis here was laid on repeated exposures of limited period instead of actually freezing the plants.

The observations as summarised in Table I reveal that the seedlings are increasingly susceptible to the increased duration of exposure. The mortality is considerably greater during the recovery period under exposures of longer duration. In many other plants it has been shown that death may not occur until days or even weeks after freezing[1,6,8,9].

Different organs of the plant may differ in the capacity to tolerate cold[2]. In

TABLE I : **Result of repeated exposures to sub-freezing temperature for six days on *E. indica* seedlings**

Duration at −10°C per day in hr.	Day of appearance of injury	Organ to be first affected	No. of plants dead in 6 days (out of 15 plants)	Total no. of plants dead up to the end of recovery period (out of 15 plants)	Height at the end of recovery period (cm)
0	0	0	0	0	18·21
0·5	3	Outer most leaf	0	1	3·90
1·0	3	,,	3	7	3·68
1·5	2	,,	4	11	2·50
2·0	2	,,	4	12	1·33

E. indica, the older leaves are first to be affected while the younger ones are more cold resistant. This observation is in conformity with other reports[5]. Chlorosis is the first symptom of cold injury in the older leaves of this plant. In some other plants also chlorosis has been found to develop due to chilling[3,11].

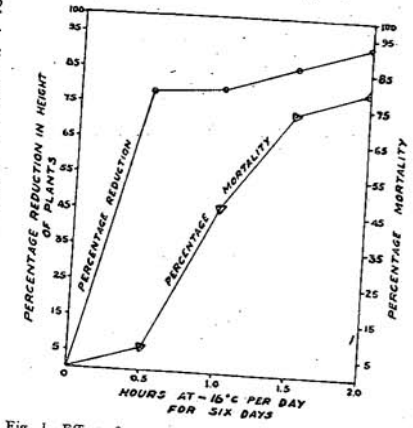

Fig. 1. Effect of exposures to sub-freezing temperature on mortality and growth of seedlings of *E. indica*.

Fig 1. shows arrest of growth (calculated from the difference in height between control and treated plants and expressed as

percentage reduction in height, which is quite conspicuous even in seedlings which were exposed only for 0.5 hr/day.

In many plants short exposures of 1 to 2 min. to low temperature (−5 to −10°C) have been reported to cause obvious injury a few hours after transfer to green-house[7]. On the other hand, many plants native to cold climates are able to survive sub-freezing temperatures[10] as low as −62°C [2]. The susceptibility of *E. indica* to such short exposures of sub-freezing temperature suggests that the species is a native of tropics because such plants are highly susceptible to low temperature[2,4]. The plants of this species occurring in temperate countries may have reached there through the agency of man, as evident by their occurrence at ports and docks[12], and have since underwent acclimatization.

It may also be mentioned that after the recovery period, the seedlings were transferred to large manured pots for further observations. No seedling except that of 0.5 hr/day treatment could survive. These plants flowered 14-18 days earlier than the non-treated plants.

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