

and six subterminal chromosomes. The present taxon was a diploid, though a number of cytological races from W. Himalayan region have earlier been reported by Mehra and Malik<sup>2</sup>.

In a widespread species, morphological variation along a geographical gradient is usually continuous or intracinal. But in the present taxon, the variation in some of the more apparent morphological characters was not continuous. The magnitude of measurements in respect of plant height, leaf length, scape length and length of the raceme was much less in Cart Road taxon collected from 1,950 m as compared to Jakhoo and Dhobi-Ghat taxa collected from 2,400 m and 1,250 m respectively (figures 1, 4, 5). Extraclinal variation was thus quite evident.

In nature the plants of this species are not found on sunny slopes. The prevalent gaps along the geographical gradient were created by environmental jumps caused, over the years, by indiscriminate felling of trees and these were responsible for the separation of the three units of once continuously growing species. The local populations then diversified in their restricted niches. This is supported by the observation that shorter statured plants were noticed in the middle part of the distributional range without any inter-gradation towards lower or higher elevations. The differentiation seems to be restricted to the genic level only as karyotypes were essentially similar.

12 May 1986; Revised 17 September 1986

1. Khoshoo, T. N., *Caryologia*, 1957, 10, 55.

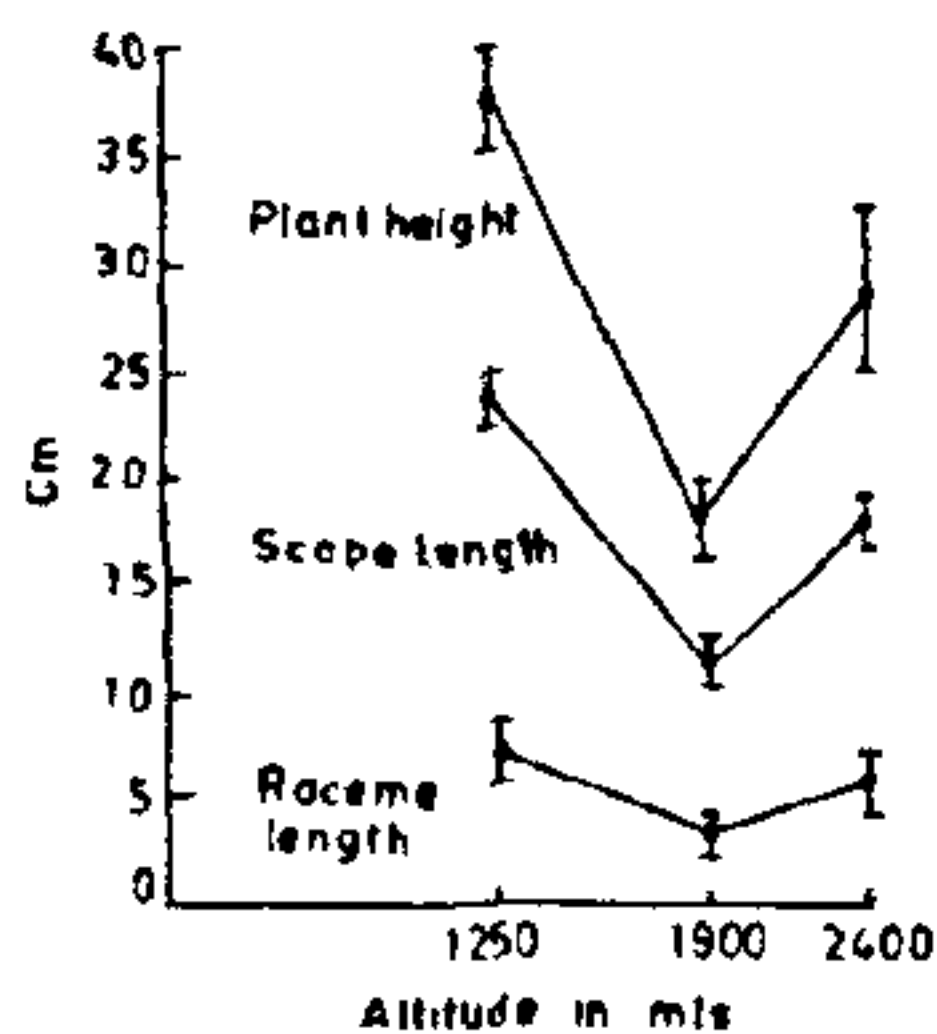


Fig 4

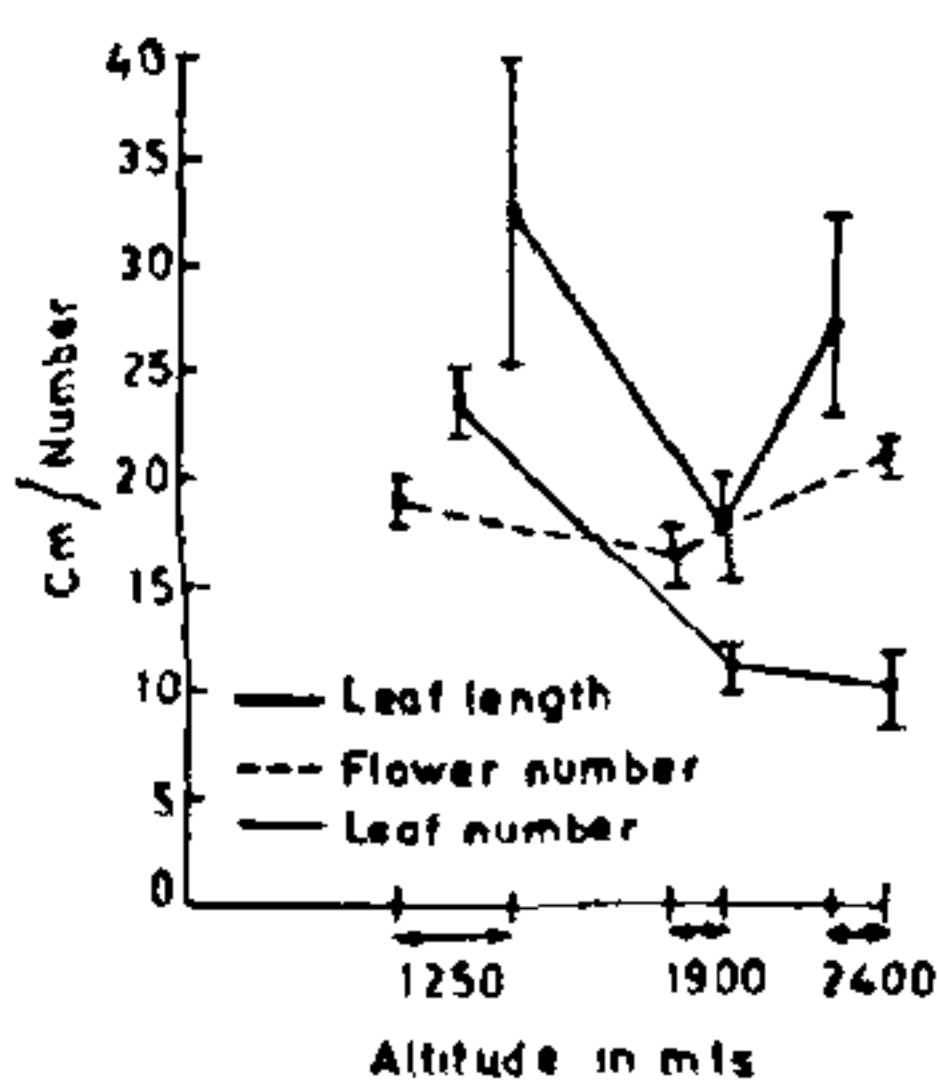


Fig 5

Figures 4 and 5. Graphs showing variations in some of the morphological characters recorded in individuals of the three populations collected from three different altitudes.

2. Mehra, P. N. and Malik, C. P., *Proc. 48th Indian Sci. Congr.*, 1961, 3, 292.

## TECHNIQUE TO DETECT GRAIN SPOT OF RICE CAUSED BY *TRICHOCONIELLA PADWICKII* (GANGULY) JAIN

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*TRICHOCONIELLA PADWICKII* (Ganguly) Jain is an important seed-borne pathogen of rice<sup>1,2</sup>. It causes stack burn, leaf spot<sup>3</sup>, seedling blight<sup>1</sup>, grain discoloration<sup>4</sup> and grain shrivelling<sup>5</sup>. Ou<sup>5</sup> reported that grains infected by the fungus show pale brown to whitish spots with a dark brown border of relatively large size on the glumes. However, there is no report of the occurrence of spot caused by this fungus on grain (husked rice).

Recently typical symptoms of *T. padwickii* infection on the grain were observed. These spots could not be identified by dry seed examination as husks were devoid of such symptoms. Hence alkali soaking technique was used to detect the grain spots in bulk seed lots. Fifty-eight seed samples received from Andaman and Nicobar islands and 22 samples collected from Dakshina Kannada District, Karnataka were analyzed for the presence of grain spot. Two hundred seeds from each of 80 samples were soaked in 50 ml of 0.4% NaOH in 100 ml Erlenmeyer flasks under laboratory conditions. The solution was decanted after 12 hr. The seeds were immersed in water in a petri plate and visually examined for the occurrence of grain spot.

To confirm the association of *T. padwickii* with grain spots, apparently healthy seeds were randomly picked from infected seed lots. The husks were removed using forceps and needle and grains with spots were separated. Twenty-five such grains from each infected sample were surface-sterilized with 1% NaOCl for 5 min and placed on wet blotters in petri plates. The plates were incubated under 12/12 hr alternate cycles of near ultraviolet light and darkness at  $22 \pm 2^\circ\text{C}$ .

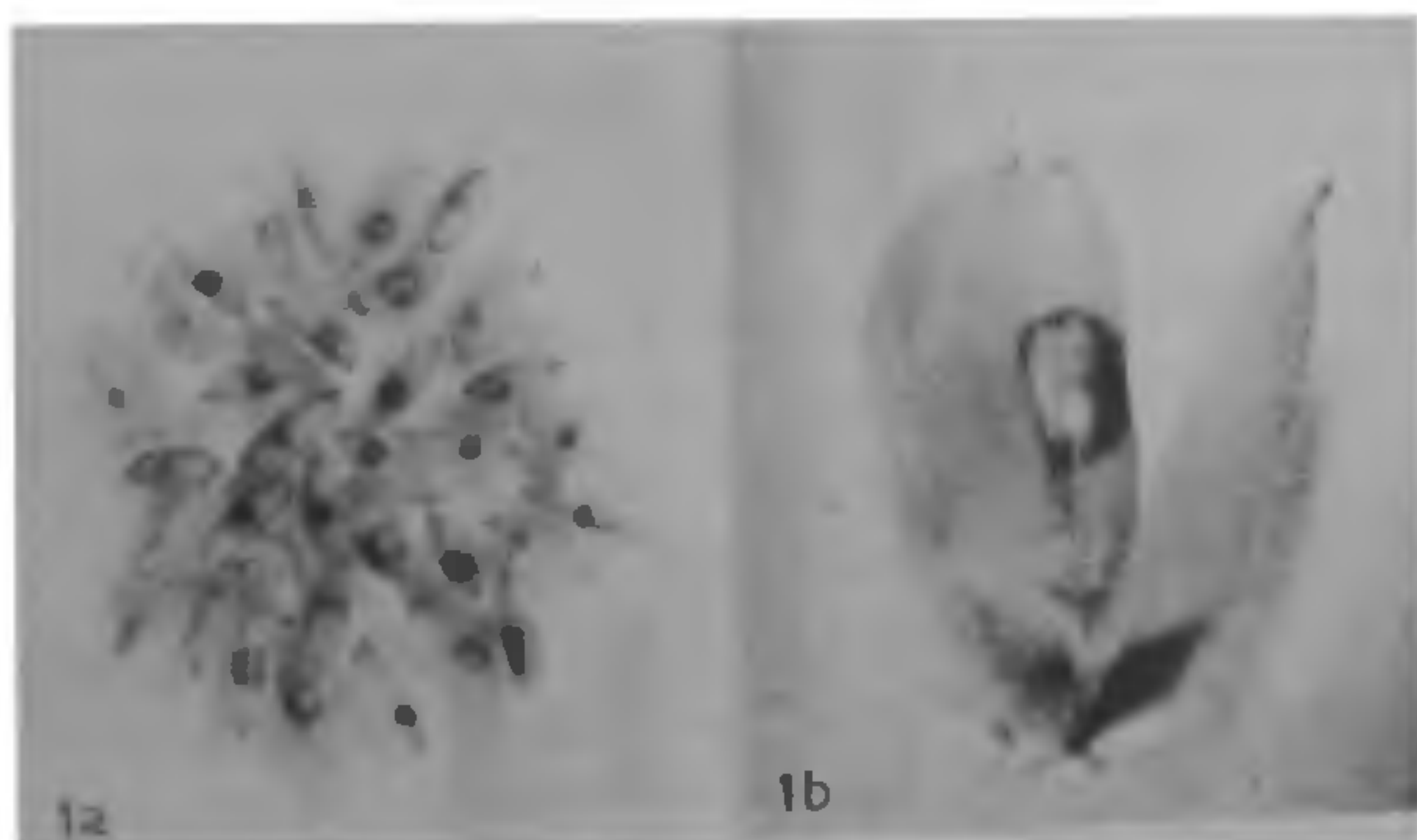
To assess the actual incidence of *T. padwickii*, 13 out of 80 seed samples were analyzed by standard blotter method<sup>6</sup> and the results were compared with grain spot incidence.

Grain spots were detected in 84% of the seed samples received from Andaman and Nicobar islands and 18% of the seed lots collected from Dakshina Kannada District, Karnataka. The spots on the grains were circular or oval, measured up to 4 mm diameter, with a dark brown margin and pale centre (figures 1a and 1b). Often black dots were associated with the brown margin. The spot could be found at any region on the grain. However, it was more frequent in the middle region. Usually one spot was found in each infected grain. On incubation sporulating *T. padwickii* colonies developed from grain spots.

Usually on the seed, *T. padwickii* expresses and sporulates on the 8th day of incubation<sup>7</sup>. But from the grain spot, sporulating *T. padwickii* colonies developed on the third day. All the 13 samples selected for comparison of *T. padwickii* incidence and grain spot incidence, revealed the occurrence of *T. padwickii* and the percentage incidence ranged from 4 (cv. Phalgun) to 69 (cv. 3280). However, only 8 samples showed grain spots and the incidence varied from 0.1% to 5% (table 1), but there was no agreement between the percentage incidence of *T. padwickii* revealed by the standard blotter method and grain spot observed by the present alkali soaking technique. All the samples having *T. padwickii* incidence did not exhibit grain spots whereas all the samples showing grain spot revealed the incidence of *T. padwickii*.

Grain spot of rice can be detected in bulk seed lots in 12 hr by using the alkali soaking technique and it can be utilized in seed health testing programmes.

Similar spot caused by *T. padwickii* was reported only on glumes<sup>5</sup>. But the samples analyzed in the



**Figures 1a and b.** a. Sodium hydroxide-treated rice seeds, kept immersed in water, showing spots of *T. padwickii*; b. *T. padwickii* spot seen only on the grain.

**Table 1** Incidence of *T. padwickii* and grain spot in rice seed lots

Cultivars	Percentage of fungus incidence	Percentage of grain spot incidence
Phalgun	4	0.4
Jyothi	8	0.6
Jaya (a)	13.5	0.0
Rajakayame	18.5	0.0
CR-210-9009	20	4
Jaya (b)	26	0.1
Sannakki	26	0.0
MW 10	26.5	4
PTB-9 (a)	29	0.1
PTB-9 (b)	32.5	0.0
Shakti	36	0.0
CR-260-131	42	5
3280	69	2

(a) and (b) are the samples of the same cultivar collected from different sources.

present study showed spots only on the grains. This is the first report of the occurrence of spots on the grains due to *T. padwickii*. It is also evident from the present study that *T. padwickii* may or may not produce grain spot symptoms when it colonizes the seed. This may be due to the various factors such as aggressiveness of the *T. padwickii* isolate infecting the seed, reaction of host cultivars, amount of inoculum invading the host tissues, time of infection and the weather conditions operating in the field.

SAS and SR thank UGC, New Delhi for financial assistance under DRS programme.

14 July 1986; Revised 20 October 1986

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