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## PRODUCTION OF MOMILACTONE ASSOCIATED WITH RESISTANCE OF RICE CULTIVARS TO SHEATH ROT DISEASE

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It is of common occurrence in the field that semi-dwarf rice cvs. are highly susceptible while the tall ones are resistant to sheath rot disease caused by *Acrocyndrium oryzae*<sup>1</sup>. It created an interest and hence it was considered worthwhile to investigate the cause of this differential resistance. Cartwright *et al.*<sup>2</sup> demonstrated that a phytoalexin, known as momilactone (a diterpene lactone) was associated with defence reaction of rice plants and therefore it was decided to ascertain whether momilactone was any way involved in differential resistance of tall and semi-dwarf rice cultivars.

At first biological activities of leaf sheath exudates and diffusates of both Mahsuri (tall and resistant) and Jaya (Semi-dwarf and susceptible) cultivars were tested against fresh spores of *A. oryzae* following the method of Purkayastha and Mukhopadhyay<sup>3</sup>. The results indicate that diffusates from Mahsuri were more antifungal (74% inhibition of germination; 70% inhibition of germ tube length) than that of semi-

dwarf one (12% inhibition of germination and 40% inhibition of germ tube length).

No fungitoxicity was, however, detected either in leaf sheath exudates or in spore germination fluid (*i.e.* drops of spore suspension placed on clean glass slides, collected after 48 hr of incubation, combined, centrifuged and the supernatant used as germination fluid). Besides, momilactone A was detected in trace in the diffusates of resistant cv. (Mahsuri—10 week-old) only but not in the exudate.

To obtain greater amount of momilactone A *Acrocyndrium*-infected, dark grown coleoptiles (3 tall and 3 semi-dwarf rice cvs.) and infected leaf sheaths (one tall and one semi-dwarf cvs.) of rice were extracted separately<sup>3</sup>. Momilactone A was isolated after 48 hr of incubation, when no symptom of disease was observed. The infected coleoptiles/leaf sheaths (250 g) of each cultivar were extracted twice with 75% ethanol and filtered. The residue was reextracted overnight at 4° C with 50% ethanol and filtered. The filtrates were combined and evaporated to dryness at 35° C in a rotary evaporator. The residue was dissolved in 100 ml water and extracted thrice with equal volume of diethyl ether. The organic phases were combined, reduced in volume and washed with phosphate buffer (1.4 M, pH 6.3). The ether fraction was evaporated to dryness, residue dissolved in 95% ethanol and applied to a Sephadex LH.20 column. Rest of the procedure was as described<sup>2</sup>. Momilactone A was identified by UV-spectrophotometry, IR-spectrophotometry and thin layer chromatography (TLC) but for quantitative analysis UV-spectrophotometry was used. The results are given in Table I.

TABLE I

Comparison of momilactone 'A' level in different rice cvs.

Cultivars	Concentration of momilactone A in µg/g (fresh weight)
<i>Tall cvs. (coleoptile)</i>	
Badkalamkati	21.36
Mahsuri	16.02
Rupsail	12.91
Mahsuri (leaf sheath)	19.36
<i>Semi-dwarf cvs. (coleoptile)</i>	
Jaya	5.59
CR-126 42 1	8.13
Ratna	5.58
Jaya (leaf sheath)	8.64

It is significant to note that coleoptiles of tall cvs. (resistant to *A. oryzae*) contain greater amount of momilactone A (12.91-21.36  $\mu\text{g/g}$  fresh wt.) while the semi-dwarf cvs. contain relatively lower amount (5.58-8.13  $\mu\text{g/g}$  fresh wt.). Difference in momilactone A content of leaf sheaths of tall cv. Mahsuri (19.36  $\mu\text{g/g}$  fresh wt.) and semi-dwarf cv. Jaya (8.64  $\mu\text{g/g}$  fresh wt.) was also significant. Antifungal nature of the said compound was confirmed by TLC<sup>2</sup>, petridish<sup>4</sup> and slide<sup>5</sup> bioassay tests. However, it is not judicious to generalize that all tall cvs. are resistant and all semi-dwarfs are susceptible to sheath rot disease. But there is an indication that resistant cvs. contain relatively higher amount of momilactone A than susceptible ones irrespective of coleoptiles or leaf sheaths. Momilactone A has only been estimated in this study. Since the concentration of momilactone B is comparatively much lower than momilactone A it has not been possible to detect it in all cases and hence it is not included.

Response of *A. oryzae* to different doses of momilactone A was also studied *in vitro*. Momilactone A isolated by TLC from 12.5 g (fresh wt.) of dark grown coleoptiles of rice (cv. Rupsail) was dissolved in 1 ml. of purified ethanol, this concentration was designated as 'x'. About 50% reduction in germtube growth of *A. oryzae* was observed when fresh spores were suspended in diluted solution (x/8). At 'x' concentration there was no germination of spores.

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## INHERITANCE AND LINKAGE RELATIONSHIPS OF THREE QUALITATIVE CHARACTERS IN SORGHUM

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THE available literature on sorghum linkages was summarised by Ghawghawe *et al*<sup>1</sup>. This paved the way to a comprehensive understanding of the linkage groups in sorghum. There were very few reports on sorghum linkages during the period from 1966-1978. The present investigation is an attempt to fill in the said gap.

A cross was made between two genotypes-SB1066 and IS873. The F<sub>2</sub> consisted of 1130 plants. F<sub>2</sub> ratios were confirmed by the F<sub>3</sub> breeding behaviour. The recombination values were computed according to Kolhe<sup>3</sup>.

The phenotypes of the parents, F<sub>1</sub> and F<sub>2</sub> ratios are presented in table 1.

### A. Inheritance studies.

1) *Internode covering*: Sreeramulu<sup>4</sup> was the first to probe into the inheritance of this contrasting character normal vs telescopic leaf sheath. He obtained a monogenic F<sub>2</sub> ratio of 3 telescopic:1 normal in his studies. However we<sup>5,6</sup> obtained a trihybrid ratio of 54 normal:10 telescopic in our previous studies. We designated the factors concerned as Lt<sub>1</sub>, Lt<sub>2</sub>, Lt<sub>3</sub>. All these factors are duplicate but complimentary in action. Our results from the present study are in concurrence with our previous reports<sup>5,6</sup>. However, two duplicate genes were found responsible in governing the inheritance of this contrasting pair of character in the studies of Jayaramaiah and Goud<sup>2</sup>. This clearly indicates that the factors concerned in the present study and those reported by Jayaramaiah and Goud<sup>2</sup> appear to be different.

2) *Dry glume colour*: A ratio of 111 coloured:145 colourless was fitted in for this character. A basic gene Cg and three inhibitory complimentary genes I-Cga, I-Cgb and I-Cgc were contemplated to govern the inheritance of this character. The three inhibitory genes compliment together and prevent the appearance of the colour. The inheritance of this character viz., colourless vs coloured dry glume is being reported for the first time.

3) *Panicle drooping*: The inheritance of this character drooping vs erect is reported for the first time. The F<sub>2</sub> populations segregated in a ratio of 54 (drooping):10 (erect). The gene action involved here is the same as that explained for internode covering. New gene symbols Pdr<sub>1</sub>, Pdr<sub>2</sub> and Pdr<sub>3</sub> were