and transpiration (table 1). Potassium was determined flame-photometrically in oven-dried leaf material after digestion with nitric and perchloric acids[11]. Transpiration and leaf diffusive resistance were measured on a steady state porometer (Licor 1600).

In plants supplied with low potassium, the tissue concentration of potassium was markedly less than in normal plants and between 10 and 11 weeks, these plants developed chlorosis along the margins of the old leaves. As the deficiency prolonged, these leaves became thick and puckered. Their lamina appeared uneven and curled outwards. The chlorotic margins of the old leaves developed numerous small necrotic spots that merged into one another. After turning severely necrotic, dry and brittle, the old leaves were shed premature.

Potassium deficiency had only marginal effect on transpiration and leaf diffusive resistance for 9 weeks (table 1), up to which low potassium plants were free from visible symptoms of potassium deficiency; but thereafter, these leaves showed increase in the leaf diffusive resistance with concomitant decrease in the transpiration rate. Plants that received 4 mM K throughout and to which potassium supply was reduced to 0.2 mM after 11 weeks did not show much difference in transpiration and leaf diffusive resistance but increasing the potassium supply from 0.2 mM to 4 mM caused marked increase in tissue concentration of potassium and amelioration in low potassium effect on leaf diffusive resistance and transpiration. In fact, within a week of the recovery treatment to low potassium plants, their transpiration rate became higher than in plants maintained at normal potassium supply.

The present study not only shows that in low potassium plants, the decrease in transpiration is associated with a build up of high diffusive resistance but also that recovery from potassium deficiency results in reversal of both these changes. The decrease in transpiration under potassium deficiency can be attributed to potassium effect on stomatal movement[1] and leaf morphology, causing increase in diffusive resistance as observed here and earlier[12,13]. The possible increase in root resistance to flow of water under potassium deficiency[14] would also contribute to decrease in water loss from such plants.

We attribute the diversity in the potassium effect on transpiration reported here and by earlier workers[8,9] to difference in the age and the severity of potassium deficiency effect in plants, both of which influence the potassium effect on transpiration. Variation in the potassium effect on transpiration with age and level of potassium supply has also been reported by Biebl[15].

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ROLE OF CONIDIA IN RECURRENCE OF ERGOT OF BAJRA

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THE ergot pathogen manifests itself in the ovary of bajra to produce honey dew (Sphacelial stage). The sphacelial stage is followed by the development of sclerotia, which are the major source of primary inoculum in the following year.

Detailed investigations were carried out to study the role of conidia adhering to the sclerotium in the recurrence of the disease. Sclerotia placed in petri dishes containing sterilized soil gave white mycelial

growth, which subsequently produced conidia. The conidia in the honey dew adhering to the infected earhead and on the plant debris germinated to produce mycelium and conidia in subsequent years. Fresh honey dew collected from infected earheads and stored under laboratory conditions for one and two years, when used for inoculation, produced successful infection. These indicated that the conidia were viable up to 24 months. The initial infection through the stigma and style is followed by profuse mycelial growth and colonization inside the ovary. Distinct acervuli with conidiophores and conidia were seen inside the ovary. The conidia are liberated along with sugary exudations from the florets as honey dew.

A large number of sclerotia examined under SEM also showed acervuli containing numerous conidia. Presence of such acervuli even in the mature sclerotium provides evidence to support the view that the conidia from previous years play an important role in the recurrence of the disease.

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A SCREENING METHOD FOR DROUGHT TOLERANCE IN COCOA

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Cocoa trees are extremely sensitive to drought and hence the expansion of its cultivation in Southern India is limited as these areas face periodic droughts. To overcome this difficulty detailed studies were carried out to identify drought-tolerant accessions of cocoa at this Regional Station[1,2]. Although the ultimate test of drought tolerance is the yield stability under drought conditions, it is very expensive involving land, labour and manpower. Any simple and rapid method for large scale screening of germplasm holding and hybrid lines will be of great value. Using the known drought-tolerant cocoa accessions, we have developed a rapid screening method by measuring leaf water potential in excised leaves.

Five 12-year-old drought-tolerant accessions (NC 23, NC 29, NC 31, NC 39 and NC 42) of cocoa (*Theobroma cacao* Linn.) and 4 susceptible accessions (NC 9, NC 49, NC 52 and NC 55) were used. The method was as follows: leaves of cocoa plants (3rd or 4th leaf) were excised and immediately water potential was determined in triplicate for each accession using a Scholander's pressure chamber

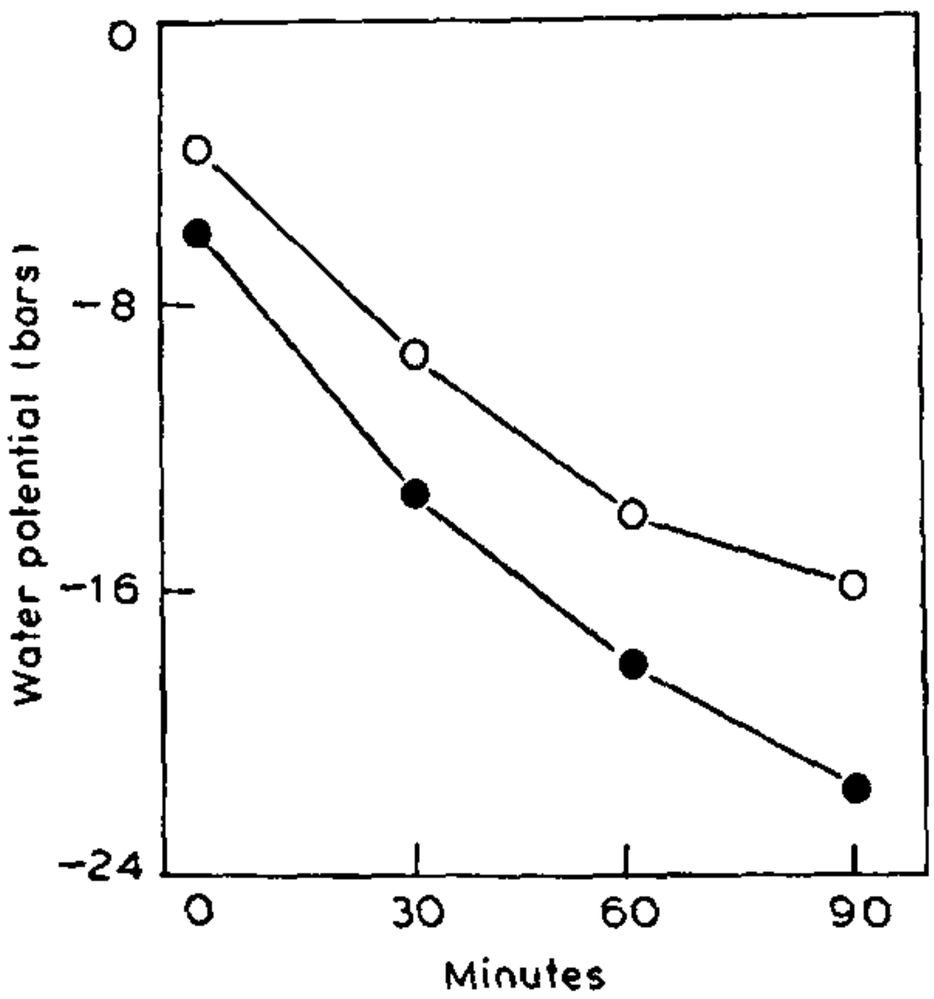

Figure 1. Changes in water potential in excised leaves of tolerant (○) and susceptible (●) trees; the differences significant at 1% level.

(Soil Moisture Equipments Corporation, USA). The excised leaves were then kept in beakers (30 ± 1°C and 68.9% relative humidity) and allowed for air-drying. Water potential was determined in the excised leaves at 30 min intervals up to 1.5 h.

The decrease in water potential was more pronounced in susceptible as compared to tolerant accessions under laboratory stress and the differences were highly significant (figure 1). It has been reported that water potential measurement can be successfully used to screen field grown sorghum genotypes for drought tolerance[3]. The method described here eliminates the difficulty of screening under field conditions in a perennial crop like cocoa. Thus, the method can be employed to upgrade the population for future evaluation under field drought conditions. Drought tolerance in cocoa is characterized mainly by an efficient stomatal regulation reducing transpirational water loss under drought leading to a maintenance of leaf turgor[2].

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