EFFECT OF SOIL SALINITY ON THE ECTOMYCORRHIZAL NODULES IN *EUCALYPTUS CAMALDULENSIS* DEHN.

by

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Introduction. The work reported here is part of an investigation on the physiological basis of salinity tolerance in *Eucalyptus camaldulensis* Dehn.,—a species extensively planted under irrigated conditions in Pakistan (Khan, 1955). Presented here is the description of an ectomycorrhiza in this species which is adversely affected by soil salinity.

Material and Methods. One year old nursery raised seedlings of *E. camaldulensis* (Source D.I. Khan) were transplanted with earthballs in Mitscherlich pots having 14 kilograms of soil salinized with NaCl and CaCl[2] in I:I ratio to attain the follwing percent salt concentrations by oven dry weight of soil: 0.3, 0.6, 0.9, 1.2 and 1.5. The electrical conductivity of the original soil used was 0.15 millimhos/cm. The experiment was set up as a completely randomized monoculture with 6 treatments: 3 replications and 6 observations per treatment per replication. The soil in each pot was brought to field capacity (23.6%) moisture content by oven dry weight). Subsequently, one pot in each treatment was weighed to determine water loss and the water lost from each treatment was restored at 8.00 a.m. and 5.00 p.m. every day.

After fourteen months the non-salinized plants were tallest (Fig. 1) and an increase in the level of soil salinity was accompanied by a decrease in height. Increase in soil salinity also decreased root growth. (Fig. 2). The plants were harvested at this stage, in May 1975. The balls of earth were pulled out of the pots. These were found covered with masses of roots. Roots were heavily concentrated at the bottom of the ball of earth, especially near pot holes. These roots at the bottom of the pot holes were intensively covered with white nodular structures which were identified as mycorrhizal nodules after microscopic examination. The frequency of the organism was estimated on an arbitrary scale and rated as + + +, + +, + and absent, in descending order of frequency. The nodules were separated from roots and studied under a light microscope using lectophenol as clearing agent. (Fig. 3). Size of nodule was measured by examining 50 nodules at X31 magnification. Zak's methods (1971) of mycorrhizal characterization were applied in the laboratory.

Results and Discussion. Under natural conditions formation of white nodular ectomycorrhizae is rare in eucalypts (Chilvers and Pryor, 1968) but in potted plants they have been frequently observed. The nodules exhibited the same pattern of infection which Harley (1959) described for beech mycorrhizae. The fungal partner in this case is extremely active and the racemose branched mycorrhizal axes are bound together by mycelium forming nodules.

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The mycorrhizae were white, unbranched, sinuous and smooth, with mantle composed of tightly adhering layers of prosenchyma and attached hyphae which were hyaline, septate and had clamp connections.

The mycorrhizae turned black after treatment with concentrated $H_2 SO_4$. No colour change occurred with Fe SO_4 (10%), KOH (15%) and NH_4OH (concent.)

Following Zak (1971), the mycorrhiza was designated as *Eucalyptus camaldulensis* Dehn.—white nodule-P.F.I.

The mycorrhiza was most abundant in non-salinized soil as compared to soil with 0.3% salt concentration. No mycorrhiza was found on plant roots growing in soil with higher salt concentrations (Fig. 4).

Many investigators have shown the specific effect of soil salinity on the activity of soil mycoflora (Strogonov, 1964). He showed that fungal growth is markedly depressed under chloride salinity. This investigation indicates that chloride type salinity depressed the development of this mycorrhiza.

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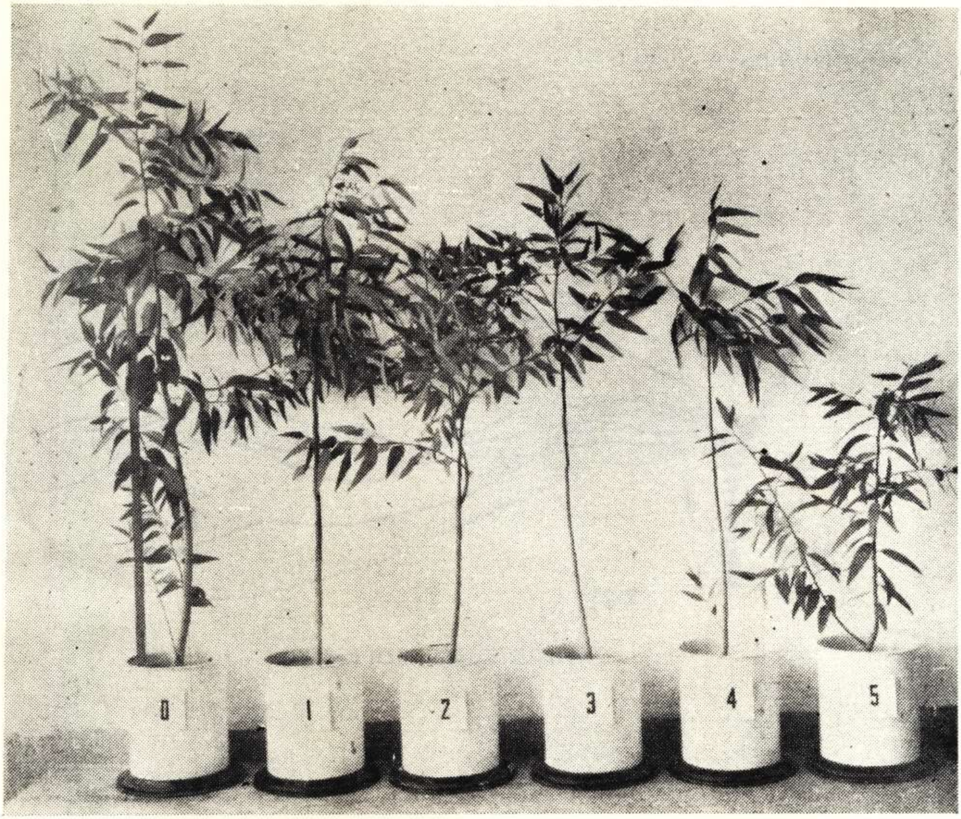

Fig. 1. Decrease of height with increase in salinity.

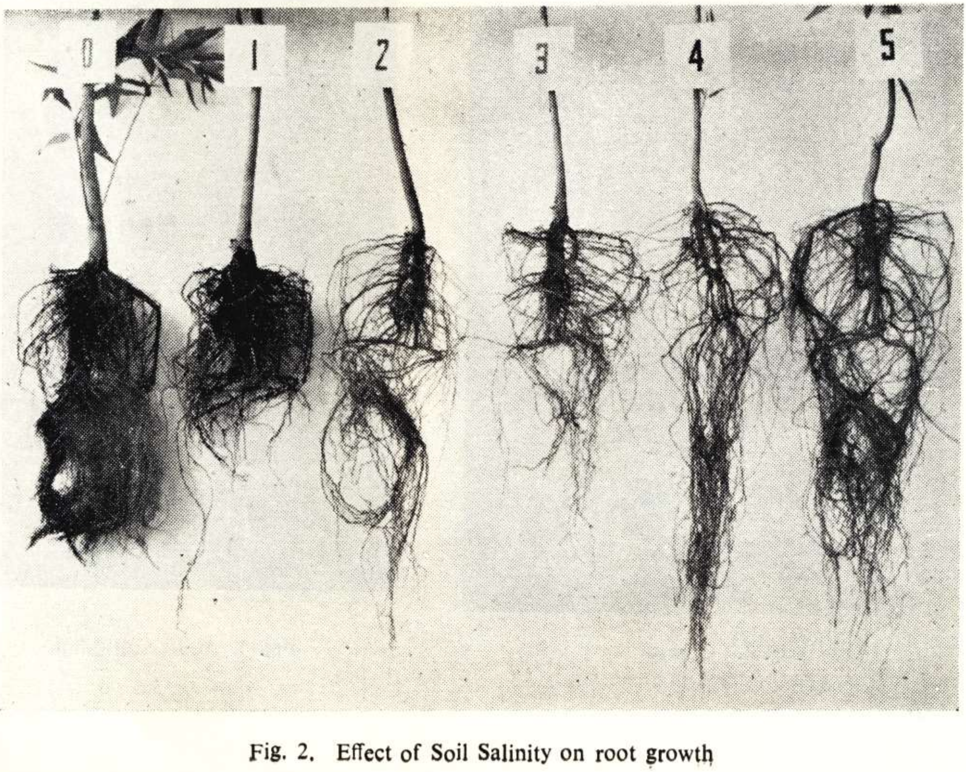

Fig. 2. Effect of Soil Salinity on root growth

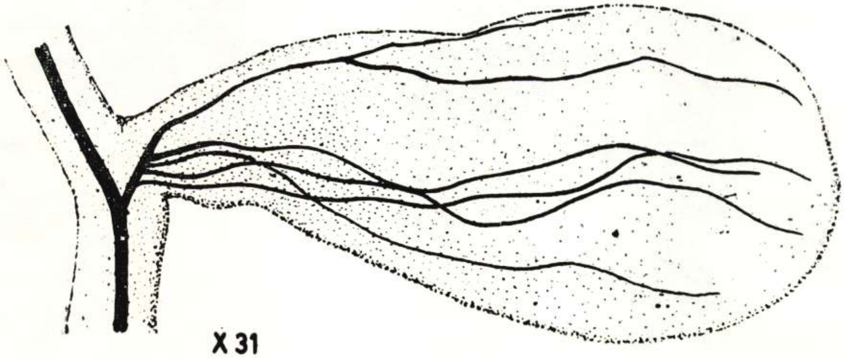

Fig. 3. Mycorrhizal nodule.

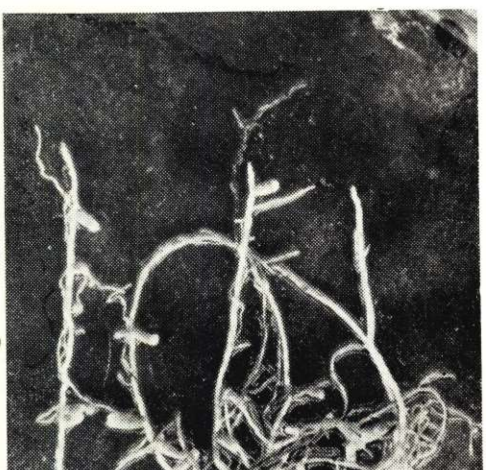

Fig. 4. Control

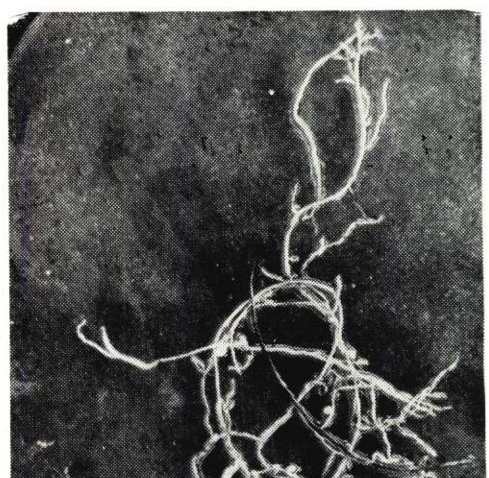

Fig. 4. 0.3% soil salinity