Fusarial wilt, a new groundnut disease in Meghalaya - Rapid screening technique for disease resistance

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Fusarial wilt, caused by *Fusarium oxysporum* Schlecht was observed in groundnut for the first time in Meghalaya during 1995-96. Considering the importance of groundnut as an emerging oilseed crop in Meghalaya and as the wilt poses a potential threat to the production of groundnut, it was thought worth while to develop/devise an efficient, reliable screening technique for identifying resistant/tolerant groundnut cultivars. Hence, different methods were evaluated.

The wilted plants were collected and used for isolation of the fungus. The fungus was identified as *Fusarium oxysporum* Schlecht and this is the first report from this area.

The microscopic observations revealed that the fungus produced both the macro and micro conidia. The macroconidia were long, 3-5 septate, slightly curved measuring 23.6 × 3.47 μm. The microconidia were small, straight measuring 9.03 × 2.58 μm. When grown on potato dextrose agar medium, the mycelium is delicate white with purple tinge.

Three methods, viz., seed inoculation, stem inoculation and root inoculation were evaluated for screening against wilt. A susceptible groundnut cultivar JL-24 was used for the present study.

In seed inoculation, seeds were surface sterilized with 0.1% mercuric chloride and subsequently washed thoroughly in sterile distilled water. They were then immersed in a spore suspension of *F. oxysporum* (1×10⁶ conidia/ml) with occasional aeration for 24 h (Mesterhazy, 1978), incubated in moist chambers at 28°C and observed for the infection (Fig. 2).

In stem inoculation method, tender stems of 20 day old plants raised in plastic pots (15cm dia) were injured with sterilized needle at the base and the inoculum was inserted (Fig. 3). High humidity was maintained for 48h by covering the plastic pots with polythene bags and observed for the appearance of the visible symptoms of the disease.

In root inoculation method, the seedlings were grown in sterilized sand. Ten day old seedlings were transferred to the Hoagland’s solution. When the plants became 20 day old, they were kept in spore suspension (1×10⁶ conidia/ml) for 24 h after cutting the root tips with a sterilized blade (Fig. 4). During this period, the
spore suspension was stirred occasionally to prevent the settling of the spores at the bottom. After removing from spore suspension, the plants were again kept in Hoagland's solution and observed for the appearance of the symptoms. For each method, control was maintained without spore suspension.

To ascertain the effective concentration of spore suspension for inoculation, the groundnut seedlings were kept in different concentrations of spore suspensions, viz., $5 \times 10^4$, $2 \times 10^5$ and $1 \times 10^6$ conidia/ml. After 24h, the seedlings were removed and returned to the Hoagland's solution (Fig. I). The number of infected seedlings were recorded for each concentration and the percent infection was calculated. The maximum infection (100%) was observed with $1 \times 10^6$ conidia/ml.

Out of the three methods, root inoculation method was found to be the most efficient. The visible symptoms of the disease appeared on the tenth day after inoculation and the infection was 100 percent. As the clipped roots were dipped in spore suspension, there may be direct penetration of the pathogen into the root (Armstrong and Armstrong, 1958). Latin and Snell (1986) observed that dipping of uprooted seedlings in spore suspension was effective to induce Fusarium wilt conditions in musk melon. Groundnut wilt caused by Fusarium solani was reported by Lima and Aguillar (1978) who proved the pathogenicity of the fungus by dipping seeds and seedlings in a spore suspension.

In the other two methods (seed and stem), the incubation period for the disease development was more and percent infection was also less. In seed inoculation method, brownish discoloration was found on the roots and root growth was stunted. Less number of root hairs were also observed. The root length in the infected seedlings was 3.74cm whereas in healthy, it was 10.56cm.

Based on the above results, it is inferred that the Fusarium oxysporum is the causal agent of groundnut wilt in Meghalaya. Out of the three methods of inoculation tried, root inoculation in Hoagland's solution was the best in comparison to the other two methods for proving the pathogenicity. This technique can be useful in screening the large number of germplasm for disease resistance.

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REFERENCES

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