

| <i>R<sub>f</sub></i> values |      |
|-----------------------------|------|
| M                           | F    |
| ..                          | 0.28 |
| 0.34                        | 0.34 |
| 0.46                        | ..   |
| 0.64                        | 0.64 |
| 0.68                        | 0.68 |

**Figure 1.** Peroxidase isoenzyme pattern in the living bark tissue of male (M) and female (F) *Bursera penicillata* (mature as well as young) during April, September and December.

ambiguous cases in respect of (i) young *Bursera* plants raised through shoot cuttings and (ii) mature *Bursera* plants. It may be noted that the *Bursera* plants are raised both by way of potted seedlings as well as rooted shoot cuttings<sup>2</sup>.

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## A NEW METHOD TO DETECT *FUSARIUM* SPECIES IN SORGHUM SEEDS

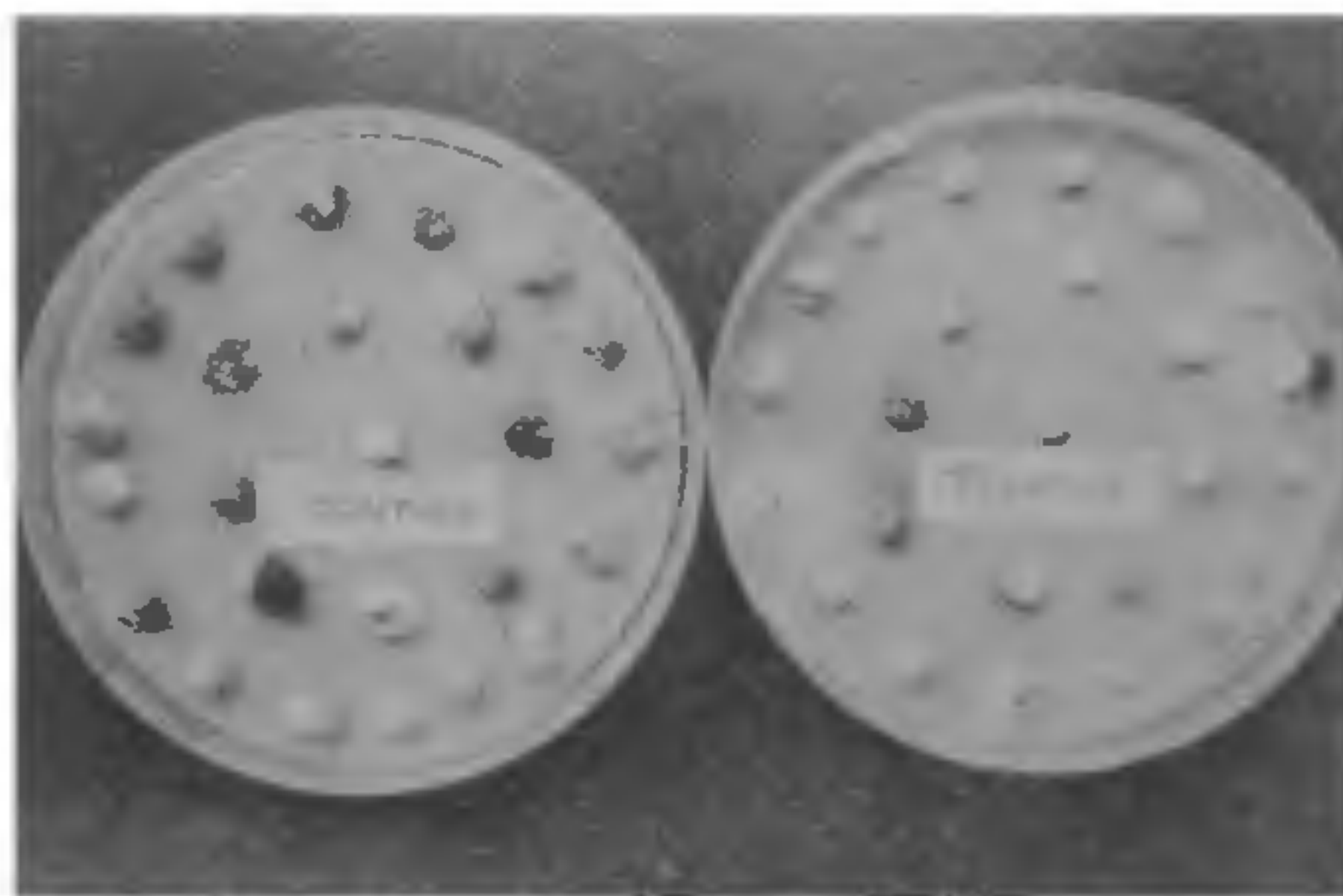
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ALTHOUGH standard blotter method is an universally accepted procedure for routine seed health testing<sup>1</sup>, many important slow growing seed-borne fungi cannot be detected precisely due to the overgrowth of saprophytic fungi, thus giving erroneous results<sup>2</sup>. Although *Fusarium* species can be isolated by Agar

plate method using 0.2% pentachloronitrobenzene (PCNB)<sup>3,4</sup>, such a selective isolation procedure is not available for routine seed health testing. In this paper a novel method of detection of *Fusarium* spp in sorghum seeds (*Sorghum bicolor* L.) has been suggested which is a modification of the standard blotter method.

Four hundred seeds of each of the five advanced cultivars namely SPV-104, IS 5675, E-35-1, IS 2042 × IS 225)-2 and Uchv-2 × wa × Nigerian)-2 were surface-sterilised using 1% NaOCl for 3 min, then soaked in different concentrations (10, 25, 50 and 100 ppm) of purified crystalline fusaric acid (5, butyl-picolinic acid obtained from Sigma Chemicals, USA) for 24 hr. Seeds removed after 24 hr were plated on blotters moistened with 0.1% water solution of the sodium salt of 2,4-Dichlorophenoxyacetic acid. The seeds were incubated for seven days as described in ISTA Rule<sup>1</sup>.

The observation showed that in all the samples, *Fusarium* sp expressed to the maximum extent with the elimination of almost all other seed-borne pathogens, except for some toxin-producing fungi like *Aspergillus flavus*, *A. niger* and *Penicillium* spp (figure 1). Of the four concentrations of fusaric acid used 50 ppm gave maximum expression of *Fusarium* sp, followed by 25, 10 and 100 ppm. In all the samples incidence of *Fusarium* increased over the control due to the elimination of other fungal genera which compete with the *Fusarium* sp. Many earlier workers<sup>5-9</sup>, attributed that fusaric acid has phytotoxic effect and inhibits the seed germination. Induction of wilt symptoms at 10 ppm was reported<sup>10</sup>, due to the toxin phytonivein produced by *F. oxysporum* f. sp. *niveum*. In our study, soaking seeds in 50 ppm fusaric acid solution for 24 hr did not affect either the seed germination or seedling vigour.



**Figure 1.** Sorghum seeds treated with fusaric acid showing selective expression of different *Fusarium* species.

**Table 1.** Average root/shoot length of different sorghum seed samples treated with fusaric acid solution (50 ppm)

| Cultivar                 | Average root length |         | Average shoot length |         |
|--------------------------|---------------------|---------|----------------------|---------|
|                          | Untreated           | Treated | Untreated            | Treated |
|                          | SPV-104             | 3.50    | 3.99                 | 2.46    |
| IS 5675                  | 5.67                | 5.94    | 7.77                 | 8.91    |
| E-35-1                   | 6.16                | 8.74*   | 7.66                 | 10.23*  |
| Uchv-2 × WA × Nigerian-1 | 5.12                | 6.12    | 4.86                 | 6.06    |
| (IS 2042 × IS 225)-2     | 7.08                | 8.00    | 6.00                 | 6.33    |

\* The values are significantly different from untreated at  $P \leq 0.05$  level as tested by *t* test.

**Table 2.** Effect of fusaric acid\* and culture filtrate of *Fusarium moniliforme* on seedling growth of sorghum

| Treatment        | Average root length (cm) | Average shoot length (cm) |
|------------------|--------------------------|---------------------------|
| Fusaric acid     | 9.63                     | 6.92                      |
| Culture filtrate | 7.15                     | 5.80                      |
| Untreated        | 10.10                    | 7.02                      |

C. D. for root length at 0.05% level 2.04; C. D. for shoot length at 0.05% level 1.00; \*Source: Sigma Chemical Co., USA.

Though the average of root/shoot length was slightly more in fusaric acid treated seedlings, the values are not statistically significant except for cultivar- E-35-1 when subjected to *t*-test (table 1).

While the natural toxic metabolite occurring in the culture filtrate of *Fusarium* sp is known to inhibit the root and shoot elongation<sup>11-13</sup>, the fusaric acid alone, in its purified form, did not inhibit the growth of root/shoot. Average shoot and root length of fusaric acid treated seedlings resembled that of control and the slight reduction observed in the root/shoot length in the fusaric acid treated seed was not significant statistically (table 2). However, culture filtrate of *F. moniliforme* has significantly reduced the root/shoot length when compared to control as well as fusaric acid treated set (table 2).

Thus by using fusaric acid, reliable infection percentage of different species of *Fusarium* in sorghum seeds can be recorded. As this method is less time consuming and more economical, it is more practicable than Agar plating method.

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### PROPAGATION OF SINGLE LEAF WITH AXILLARY BUD IN PINEAPPLE (*ANANAS COMOSUS* (L.) MERR.)

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THE pineapple is a plant whose rate of natural multiplication is particularly slow. This situation is felt