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# EFFECT OF TREATING TOMATOES WITH LEAF EXTRACTS OF CERTAIN PLANTS ON THE DEVELOPMENT OF FRUIT ROT CAUSED BY *ASPERGILLUS NIGER* IN PRESENCE OF *DROSOPHILA BUSCKII*

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Healthy ripe tomato fruits were treated with ethanolic extract of *Lantana camara*, *Mentha arvensis* and *Ocimum sanctnm* prior to and after inoculation with *Aspergillus niger*, in the presence of *Drosophila busckii* for 10, 20 and 30 minutes. There was reduction in rotting of the fruits treated with leaf extracts of these plants. The fruits remained free from rotting up to 10 days when treated with *M. arvensis;* 5 and 7 days with *L. camara* and *O. sanctum.* Treatment prior to inoculation was better than after inoculation with fungus.

**Keywords** : Tomato; *Drosophila;* Extract; Fungi.

In recent past attempts are being directed to explore the possibility of plant extracts being used for control of diseases, specially the post-harvest diseases (Bergstrom *et al.*, 1982). Tomatoes are attacked by *Aspergillus niger* during transit and storage. In the warehouses and shops the insect, *Drosophila busckii* is also found commonly feeding on such fruits. In earlier studies, the insect has been found to aggravate the incidence of tomato fruit rot caused by *A. niger* (Sinha and Saxena, 1985). Recently water extract of *Lantana camara* has been shown to be effective against this rot (Sinha and Saxena, 1987). In the present studies an attempt has been made to determine the effect of ethanolic extract of leaves of *L. camara* and other plants such as *Mentha arvensis* and *Ocimum sanctum* known for antimicrobial, properties on the development of fruit rot in the presence of the insect.

Tomato fruits of equal size and age were treated with leaf extracts of *L. camara, M. arvensis* and *O. sanctum* prepared by grinding 10 g of freshly collected washed leaves of each with 100 ml of ethanol and filtered

**Table 1.** Effect of treatment of fruits with ethanolic extract of leaves of *L. camara*, *M. arvensis* and *O. sanctum* on the development of fruit rot of tomato caused by *A. niger*.

| Treatments | | Rotting of fruits in different concentration after (days) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *L. camara* | | | *M. arvensis* | | | *O. sanctum* | | |
| | | 2 | 10 | 15 | 2 | 10 | 15 | 2 | 10 | 15 |
| Uninoculated and unfed | a | 0* | 0 | 1.2x | 0 | 2.2y | 2.4y | 0 | 0 | 2.2y |
| | b | 0 | 2.2y | 3.2z | 0 | 2.3y | 3.1z | 0 | 2.3y | 3.2z |
| Inoculated with fungus | a | 0 | 2.2y | 3.2z | 0 | 2.4y | 2.1y | 0 | 2.2y | 2.4y |
| after treatment | b | 1.1x | 2.2y | 3.1z | 1.1x | 2.3y | 3.2z | 1.1x | 2 3y | 3.1z |
| Without insect | | 0 | 2.2y | 3.4z | 0 | 2.2y | 3.4z | 0 | 2.2y | 3.4z |
| Fungus | | 1.4x | 2.3y | 3.1z | 1.4x | 2.3y | 3.1z | 1.4x | 2.3y | 3.1z |
| Inoculated with fungus | a | 0 | 2.3y | 3.2z | 0 | 2.1y | 3.2z | 0 | 2.3y | 2.4y |
| before treatment | b | 1.1x | 2.4y | 3.4z | 1.2x | 2.3y | 3.2z | 1.1x | 2.3y | 3.2z |
| Without insect | | 0 | 2.2y | 3.4z | 0 | 2.2y | 3.4z | 0 | 2.2y | 3 4z |
| fungus | | 1.4x | 2.3y | 3.1z | 1.4x | 2.3y | 3.1z | 1.4x | 2.3y | 3.1z |
| Inoculated with fungus and insect fed(mts) after treatment | | | | | | | | | | |
| 10 | a | 0 | 1.3x | 3.2z | 0 | 2.2y | 2.3y | 0 | 1.2x | 1.2x |
| | b | 1.2x | 3.2z | 3.4z | 1.2x | 3.2z | 3.4z | 1.3x | 3.2z | 3.4z |
| | c | 0 | 2.4y | 3.4z | 0 | 2.4y | 3.4z | 0 | 2.4y | 3.4z |
| 20 | a | 0 | 1.2x | 2.2y | 0 | 2.1y | 2.3y | 0 | 1.1x | 2.2y |
| | b | 1.2x | 3.2z | 3.4z | 1.2x | 3.2z | 3.4z | 1.1x | 3.2z | 3.3z |
| | c | 0 | 2.4y | 2.4y | 0 | 2.4y | 2.4y | 0 | 2.4y | 2.4y |

(*Table Contd. page 99*)

(*Cont. Table 1*)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 30 | a | 0 | 0 | 1.2x | 0 | 2.4y | 3.2z | 0 | 2.4y | 3.2z |
| | b | 2.4y | 3.2z | 3.2z | 2.4y | 3.3z | 3.4z | 2.4y | 3.3z | 3.4z |
| | c | 1.4x | 2.2y | 3.2z | 1.4x | 2.2y | 3.2z | 1.4x | 2.2y | 3.2z |
| Inoculated with fungus and insect fed(mts) before treatment | | | | | | | | | | |
| 10 | a | 0 | 1.3x | 2.2y | 0 | 2.4y | 2.1y | 0 | 3.2z | 3.2z |
| | b | 1.2x | 3.2z | 3.4z | 1.1x | 3.2z | 3.4z | 1.2x | 3.2z | 3.4z |
| | c | 0 | 2.4y | 3.4z | 0 | 2.4y | 3.4z | 0 | 2.4y | 3.4z |
| 20 | a | 0 | 1.4x | 3.2z | 0 | 3.2z | 3.4z | 0 | 0 | 2.2y |
| | b | 1.1x | 3.2z | 3.4z | 1.2x | 3.1z | 3.2z | 1.1x | 3.2z | 3.4z |
| | c | 0 | 2.4y | 2.4y | 0 | 2.4y | 2.4y | 0 | 2.4y | 2.4y |
| 30 | a | 0 | 2.2y | 2.3y | 0 | 3.2z | 3.4z | 0 | 0 | 2.3y |
| | b | 2.3y | 3.4z | 3.4z | 2.1y | 3.4z | 3.4z | 2.1y | 3.2z | 3.4z |
| | c | 1.4x | 2.2y | 3.2z | 1.4x | 2.2y | 3.2z | 1.4x | 2.2y | 3.2z |

(0)* nil=no infection, (1) poor=25% fruit surface infected, (2) moderate=25–50% fruit surface infected and (3,4) severe=>50% fruit surface infected.
Mean in the same column followed by different letters are significantly different at P=0.05.
a=Treated with leaf extract, b=control (untreated), c=alcohol sterilized.
Each reading is a mean of five replicates.

through Whatman filter paper No. 1. The fruits were dipped for 60 seconds in the ethanol extracts of the leaves and inoculated with *A. niger* by pin-prick method (Riker and Riker, 1936) both prior and after the treatment with leaf extract. These were kept in sterilized desiccators. Adults of *D. busckii* were released for 10, 20 and 30 minutes. For control the treated fruits were fed by *D. busckii* for different intervals and inoculated with fungus separately. Other controls included, fruits inoculated with fungus and unfed with insect both prior and after the treatments with ethanolic extract of different leaves and with alcohol separately. Observations were made after 2, 5, 7, 10 and 15 days. Intensities of fruit rot were noted as : nil (0), low (1), moderate (2) and severe (3–4) respectively.

When tomatoes were treated with ethanolic extract of leaves of *L. camara, M. arvensis* and *O. sanctum* and inoculated with *A. niger* followed by feeding with *D. busckii*, the rotting was minimised (Table 1). There has been a reduction in the time required for rotting when treated with various leaf extracts in ethanol. The fruits remained free from rotting up to 10 days when treated with *M. arvensis* as compared to 5 and 7 days when treated with *L. camara* and *O. sanctum* and fed by *D. busckii*. After this period rotting started vigorously. Poor rotting was observed in the initial periods i.e., up to 10 days when treated prior to inoculation with ethanolic extract of *L. camara* as compared to 5 days in *O. sanctum* and 2 days in *M. arvensis*. However, treatment with ethanolic extracts after inoculation gave lesser protection. For initial durations of 10 and 20 mts with alcohol there was no much difference in the intensity of disease but in the treatment with 30 mts duration, there was more protection of fruits in alcoholic extract than alcohol alone. It is understandable as the alcohol evaporates quickly and therefore, its efficacy is less than alcoholic extract of leaves.

Thus, ethanolic extracts of *L. camara, M. arvensis* and *O. sanctum* could provide protection to some extent to the fruits against *A. niger* and insect, *D. busckii*. It appears that the toxic principles are also probably ethanol soluble. This could partly be due to repellant effect of the extracts on insect as the plant is reported to have insecticidal properties (Pandey *et al.*, 1979). Oil of *L. camara* has been reported to be effective repelling agent against honey bee, *Apis mellifera*, mosquitoes and cattle flies (mostly *Tabanus* sp) (Attri and Singh, 1978). Of the three plants studied the extract of *L. camara* was most effective in minimising the fruit rot. The ethanol extract of leaf of *L. camara* was more effective than water

extract as reported earlier (Sinha and Saxena, 1987). Toxic principles in *O. sanctum* and *L. camara* have already been reported to act as prohibitors. It is likely that these compounds might be infulencing the development of fruit rot in the present studies (Dixit and Tripathi, 1975). Thus *L. camara*, a weed, therefore, could be used for minimising the post-harvest losses in tomatoes and would also be cheaper.

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