

## DISEASES OF SWEET BASIL—A REVIEW

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Sweet basil (*Ocimum basilicum*), a member of Labiatae, is probably a native of India and Africa. It is well-known for its aromatic qualities and use in condiments. The seed yields golden yellow essential oil which is employed in perfumery and various beverages. Cultivation of the crop is being tried at Peshawar. The literature on the diseases of the crop was, therefore, reviewed.

Kvarts Khava (1958) carried out studies on the infectious wilting (Fusariosis) in basil. The plants in the nursery were found severely attacked by a species of *Fusarium* causing longitudinal stripes on the stem and chlorotic spots on leaves which wilt and fall prematurely. The pathogen was found to invade the plants through injured roots. Plant debris, infected young transplanting material and seeds served as source of infection. The pathogen proved specific to *Ocimum* spp.

Vergouskii (1958) studied some peculiarities in the development of Fusariosis in basil. The high temperature at which basil seedlings were forced was found mainly responsible for the extensive spread of Fusariosis (*Fusarium* sp.) in nurseries. It was concluded that the temperature of the nursery soil should not exceed 20°C and basil must not be grown for more than one year in the same field. Thorough eradication of the diseased plants was also recommended.

Lovisol (1959) determined *Ocimum basilicum*, as a new differential host for lucerne mosaic virus and other plant viruses. Lucerne mosaic gave the best results. Potato virus x produced chlorotic or slightly necrotic local lesions of the ring spot type and on a line pattern of the Oak-leaf type, both being followed by a slight systemic mottling with chlorotic ring spots. The yellow strain of cucumber mosaic virus caused a brighter mosaic than that produced by the type strain. Reaction to other viruses was also described. Of 10 viruses tested, 6 caused typical symptoms and one gave doubtful result.

Negru (1959) recorded some rare species of fungi from the Romanian people's Republic including *Phoma ocimi* on the stalks and branches of basil.

Kegler (1960) made studies on the differentiation of Cherry viruses. A mixture of Pfeffinger (cherry rasp leaf virus: 39,332) and stecklenberg (Peach ring spot virus str: 39,425) were mechanically transmitted on various hosts. The former could only be reiso-

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lated from *Chenopodium foetidum*, *Datura stramonium*, *Ocimum basilicum* and *Solanum sisymbriifolium*. The stecklenberg virus could be differentiated by its symptoms on *Ammi majus* in which Pfeffinger virus was found latent.

Gerola et al (1969) carried out a submicroscopical study of the leaves of basil, alfalfa and tobacco experimentally infected with lucerne mosaic virus under the electron microscope. In the leaves of alfalfa and basil, the infection was systemic whereas in the leaves of tobacco it showed local infection. In all the three species IMV particles were always detected only in the cytoplasm. Apart from the presence of virus particles in the cytoplasm, no ultrastructural alterations were found in *Medicago sativa* and *Nicotiana tabacum*. In basil, the green leaf areas did not show any prominent alteration whereas the yellow leaf areas showed marked alteration of chloroplast. In these, the lamellar system were scarcely developed and the few thylkoides tended to fragment, curled and disappeared. In the chloroplasts stroma, there was an abnormal development of filamentous structure resembling the stroma centres.

Favali and Conti (1970) made ultrastructural studies on the chloroplasts of basil plants infected with different viruses and treated with 3-amino-1, 2, 4-triazole. The chloroplast alterations were also described.

Feldman and Gracia (1971) studied two new natural hosts of Alfalfa mosaic virus. The virus was recorded, for the first time, in the field on basil (*Ocimum basilicum*) crops and on the weed *Pitraea cuneato-ovata* including systemic symptoms of a bright yellow-white mosaic of the 'Calico' Types. The former had been previously used as a test plant for the virus (40:291).

Cook and Milbrath (1971) carried out studies on virus diseases of Papaya including identification of additional diagnostic host plants. The green house tests revealed that papaya mosaic virus and papaya rings-pot virus can be distinguished by infectivity on selected differential hosts. Plants of broad bean (*Vicia faba*), Sweet basil (*Ocimum basilicum*) and Cocks-comb (*Celosia plumosa*), not previously reported to be susceptible to either virus, were systemically infected with papaya mosaic virus. Leaves of *Chenopodium amaranticolor*, inoculated with papaya ring spot virus, developed localized lesions clearly distinguishable from those induced by papaya mosaic virus.

Dzidzariya and Giorbelidze (1972) tried some fumigants against the pathogens of diseases of East Indian basil. Of 4 fumigants tested against *Fusarium oxysporum* and *Rhizoctonia solani* on *Ocimum basilicum*, methyl bromide was most effective completely killing *Fusarium oxysporum* at 250 mg/kg.

Mitidieri (1973) carried out studies on anthracnose of basil (*Ocimum basilicum*) caused by *Colletotrichum gloeosporioides* and its sexual form *Glomerella cingulata*. Necrotic leaf spots and stem canker were found on infected plants. *Glomerella cingulata* was isolated from dead stem tissues. The disease was transmitted by inoculation to fruits of apples, grape fruits, orange, mandarine, melon, Capsicum and tomato.



Ragozzino (1973) studied *Smyrniolum olusatrum* as a new host of cucumber mosaic virus. The isolate obtained from *S. olusatrum*, an important host of cucumber mosaic virus (CMV), did not infect the *Ocimum basilicum* and *Amaranthus caudatus*.

Thakur (1973) recorded *Glomerella cingulata*, for the first time, on *Ocimum basilicum* Var. *Purpurascens*, causing a leaf spot disease.

Khadr et al (1974) reported *Alternaria* leaf spot disease on basil and Licorice from the Arab Republic of Egypt. The disease was found to be incited by two distinct isolates of *Alternaria tenuis*.

Mamula et al (1974) made studies on the identification and serological properties of tomato mosaic virus, isolated in Hungary. The tomato mosaic virus (ToMV) in tomato plants (*Lycopersicon esculentum* cv. "Moneymarker") was identified on the basis of test plants reaction, cell inclusions, serological properties and physical properties in vitro. It caused local lesions and systemic symptoms on *Ocimum basilicum*. Besides, 32 different species of plants were demonstrated as new experimental hosts of TOMV-H. The virus induced hexagonal crystals in cells. TOMV-H proved serologically identical with the type "Dahlemense" an isolate of ToMV. The Hungarian isolate of TOMV has thermal inactivation point at 92-94°C, dilution end-point at  $2 \times 10^{-6}$  and retained its infectivity in vitro after a period of two months. In desiccated tobacco leaf tissues, it remained highly infectious after two years storage.

Milicic and Plakoli (1974) studied spontaneous infection of some Labiates with Alfalfa mosaic virus. Alfalfa mosaic virus (AMV) was mechanically isolated from *Ballota nigra* showing extensive yellow symptoms on the leaf margins. Virus isolation was possible only in the spring but not in the summer and autumn.

Please and Milicic (1974) isolated virus from yellow-netted leaves of *Forsythia suspensa* and from *Lycium halimifolium* and tested its pathogenicity on different hosts. A virus isolated from yellow-netted leaves of *F. suspensa* and another isolated from normal and diffusively spotted *L. halimifolium* leaves produced the characteristic symptom caused by the cucumber mosaic virus in *Chenopodium amaranti-color*, *C. murale*, *C. quinoa*, *Cucumis sativa*, *Ocimum basilicum*, *Vigna sinensis*, *Datura stramonium*, *Lycopersicon esculentum*, *Nicotiana glutinosa* and *N. tabacum*.

Afi (1975) studied the effect of volatile substances from species of Labiatae on rhizospheric and phyllospheric fungi of *Phaseolus vulgaris*. Effect of emanation from *Origanum majorana* and *Ocimum basilicum* on the germination of spores of rhizospheric fungi of *Phaseolus vulgaris*, *Origanum majorana* and *Ocimum basilicum* plants grown singly or in association were discussed. Leaf volatile from *Origanum majorana* inhibited most bean phyllospheric fungi except *Penicillium citrinum* which was stimulated. Leaf volatile of *Ocimum basilicum* inhibited germination of *Aspergillus niger*, *Cochliobolus spicifer*, *Cunninghamella elegans*, *Fusarium moniliforme*, *Fusarium semitectum* and *Penicillium citrinum* in the bean phyllosphere whereas germination of *Alternaria tenuis* and *Penicillium*



*charmesinum* was enhanced. The leaf volatile obtained from *Origanum majorana* and *Ocimum basilicum*, inhibited germination of about half the rhizospheric fungi tested.

Grasso (1975) studied wilt of basil caused by *Fusarium oxysporum*. Leaf wilt and necrosis of the stem and roots were found in affected *Ocimum basilicum* plants. The fungus, isolated from stem and root tissues, was found parasitic.

Upadhyay and Bordoloi (1975) recorded some new diseases on *Cynuleopogon winterianus*, *C. martinii*, *Eucalyptus citriodora*, *Jasminum grandiflorum* and *Ocimum basilicum*.

Beczner et al (1976) carried out studies on virus diseases of *Solanum dulcamara*. A virus was isolated from naturally infected *Solanum dulcamara* plants showing symptoms of mild mosaic and slight puckering of the leaves. Based on the symptoms on herbaceous plants, physical properties in vitro, properties of purified preparations, serology and E.M. evidence the virus was identified as a Hungarian strain of dulcamara mottle virus (DMV-H). This was apparently the first report of the presence of dulcamara mottle virus (DMV, R/1: x 37: S/S:/Ci) outside England. Some new experimental host plants, in solanaceae were also recorded. The DMV-H infects *Ammi majus*, *Antirrhium majus*, *Tetragonia tetragonoides* only locally and *Ocimum basilicum* locally and systemically. These hosts were never shown before to be susceptible to DVM. According to the homologous and heterologous titres it was evident that the DMV-H was closely related to DMV and belladonna mottle virus (BMV-H, R/1: 2.0/37: S/=S: S/C1), and distantly related to eggplant mosaic virus (EMV, R/1: 2.5/36: S/=S: S/C1). The DMV-H did not give cross reaction with Indian potato latent virus (APLV) and turnip yellow mosaic virus (Ty MV, R/1: 1.9/34: S/S: S/C1). Spur information in agar gel double diffusion test showed that DMV-H was the most closely related to DMV. It could, therefore be considered as a serotype of DMV.

Dzidzariya and Giorgadze (1976) studied the effect of metalchelates of natural compounds against Fusariosis of East Indian basil. Treatment of East Indian basil (*Ocimum basilicum*) plants with metalchelates (1:40, 1:60 and 1:100), 3 times at intervals of 10-15 days after sowing, increased resistance to *Fusarium oxysporum*.

Regozzino and Stefanis (1976) found *Urospermum picroides* as a natural host of cucumber mosaic virus (CMV) and alfalfa mosaic virus (AMV). *Urospermum picroides* known as a wide spread host of CMV and AMV in Italy, caused latent infection. The former was responsible for latent infection whereas the latter produced yellow mosaic and dwarfing. The CMV isolate infected systemically *Ocimum basilicum* (Yellow mosaic), *Nicotiana tobacum* (Faint mosaic), *N. rustica*, *N. glutinosa*, *Cucumis sativus*, *Cucurbita pepo*, *C. maxima*, *Beta vulgaris*, *Spinacia cleracea*, *Petunia hybrida*, *Datura stramonium*, *Capsicum annuum* and *Solanum lycopersicum*. The AMV isolate infected systemically *Ocimum basilicum* and other species of plants. The CMV and AMV isolates were identified with the aid of serological and E.M. In the green house test, none of the CMV and AMV appeared seed transmitted.



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