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# STUDIES ON DOWNY MILDEW OF CUCURBITS IN RAJASTHAN: INCIDENCE, DISTRIBUTION, HOST RANGE AND YIELD LOSSES IN MUSKMELON

R. P. MAHRISHI and B S. SIRADHANA

S. K. N. College of Agriculture, Jobner-303329

Downy mildew of cucurbits caused by *Pseudoperonospora cubensis* (Berk. & Curt.) Rostow. is a serious disease in many parts of India. In Rajasthan cucurbits are grown extensively and muskmelon is an important commercial crop. Barring a single report (Anonymous, 1970) on the occurrence of downy mildew, not much is known about this important disease. Therefore, studies on incidence. distribution. host range and yield losses in muskmelon due to this disease were made.

Selected districts of Rajasthan were periodically surveyed for incidence and host range of *P. cubensis* on various cucurbits purely by random sampling method during April-December, 1980-1984. The data collected from 5 observation spots in each of the 36 locations/villages were pooled and averaged to repersent infection indices on different cucurbit hosts. Average infection index in a crop for all the locations in a district was taken as disease index for that district. Pathogenicity tests were also made and a test plant showing infection was considered as a potential (P) host while those getting no infection were termed as negative ( – ) hosts (Table 1). To estimate yield losses in muskmelon cv. 'Durgapura Madhu', different levels of disease were developed in an experiment laid down in Randomised Block Design with four replications (plot size 4x2.5 $m^2$). Different disease levels were obtained by spraying the plants with Dithane M-45 @ 0.2 per cent at different intervals. Fruit yield from each plot was recorded regularly and yields from different disease indices were compared. As disease free situation was not obtained the yields of the plants with lowest disease levels were taken as a base for computing the losses using standard formula.

Prevalance of *P. cubensis* was recorded in all the locations surveyed with maximum being at Sriganganagar. Infection was observed strictly confined to foliage and in general, on *Cucumis* species appeared to be angular to irregular in shape as compared to somewhat more angular on various gourds and *Cucurbita* species. On watermelon, pumpkin and vegetable marrow, the lesions were also comparatively smaller. Infection was most destructive on muskmelon, longmelon, cucumber, spongegourd and ridgegourd (Table 2). Roundgourd was not observed in fected under natural conditions but infection occurred on artificial inoculation with sporangial suspension taken from muskmelon and ridgegourd. From Punjab, Bains and Jhooty (1976) while making similar studies reported that downy mildew was not

Table 1. Incidence of *Pseudoperonospora cubensis* in selected districts of Rajasthan

| District (Average) | Per cent infection on | | | | | |
|---|---|---|---|---|---|---|
| | *C. melo* | *C. vulgaris* | *C. melo* var *utilissimus* | *L. acutangula* | *L. siceraria* | *Cucurbita moschata* |
| AJMER | 42.23 | $D_0$ | 42.20 | 54.74 | 7.20 | 9.65 |
| ALWAR | 36.60 | $H_0$ | 44 88 | 56.32 | 8.46 | 7.46 |
| BHILWARA | 41.20 | $D_0$ | 46.86 | 51.83 | $D_0$ | $D_0$ |
| JAIPUR | 58.62 | 16.40 | 56.28 | 57.33 | 14.20 | 21.37 |
| SIROHI-PALI | 38.70 | $H_0$ | 46.25 | 58.94 | $D_0$ | $D_0$ |
| SRIGANGANAGAR | 71.92 | 27.23 | 66.87 | 68.50 | 11.75 | 13.70 |
| TONK | 46.25 | 20.65 | 48.25 | 50 50 | $H_0$ | $D_0$ |
| UDAIPUR | 48.60 | $D_0$ | 17.75 | 61.90 | $D_0$ | $D_0$ |

$H_0$ = Host absent

$D_0$ = Disease absent

present on the leaves of roundgourd. Also, watermelon was not mentioned in their host list but under present study (Table 1) watermelon was observed as a natural host like Venkatanarayana and Venkatakrishniah (1952) from Mysore. On wild cucurbits commonly growing in Rajasthan *P. cubensis* was also observed on wild melon [*Cucumis callosus* (Rotl ) Cogn.], *Melothria maderaspatana* L., and *Trichosanthes cucumerina* L. in nature. On wild bittergourd (*Momordica* sp.) and wild watermelon (*Citrullus colocynthes* Schrad.) the disease was not observed even with artificial inoculations in agreement with Bains and Jhooty (1976). Oospores were also observed on *C. callosus* and *M. maderaspatana* under natural conditions and are new records (Mahrishi and Siradhana, 1984). Oospores were round, rarely obovoid to ellipsoid, 20 µm in diameter.

Table 2. Host range of *Pseudoperonospora cubensis* in Rajasthan

| Host | Host status | |
|---|---|---|
| *CULTIVATED CUCURBITS* : | | |
| *Cucumis melo* L. (Muskmelon) | P | |
| *Cucumis sativus* L. (Cucumber) | P | |
| *C. melo* var. *utilissimus* L. (longmelon) | P | |
| *Luffa acutangula* Roxb. (Ridgegourd) | P | |
| *L. cylindrica* Roem. (Spongegourd) | P | |
| *Momordica charantia* L. (Bittergourd) | | |
| *Lagenaria siceraria* (Mol.) Standl. (Bottlegourd) | P | * |
| *Cucurbita moschata* Duches. (Pumpkin) | P | * |
| *C. pepo* L. (Vegetable marrow) | P | |
| *Trichosanthes anguina* L. (Snakegourd) | P | |
| *Citrullus vulgaris* Schrad. (Watermelon) | P | |
| *C. vulgaris* var. *fistulosus* Stewart (Roundgourd) | P | |
| *WILD CUCURBITS* : | | |
| *Momordica* sp. (Wild Bittergourd) | — | |
| *Cucumis callosus* (rotl.) Cogn. (Wild melon) | P | * |
| *Citrullus colocynthes* Schrad. (Wild Watermelon) | — | |
| *Melothria maderaspatana* L. | P | * |
| *Trichosanthes cucumerina* L. | P | |

P = Potential host
– = Non-host
* = Produce oospores

With regard to estimation of losses, it was observed that losses increased with the increase in disease intensity. Thus, plots receiving no spray, three and four sprays at 10 days interval registered 79.06, 47.67 and 28.49 per cent losses in fruit yield as compared to plots which received 5 sprays of Dithane M-45 @ 0.2 per cent at 7 days interval with per cent disease intensities of 68.75, 38.87 and 22.37 respectively (Table 3).

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Table 3. Losses in fruit yield of muskmelon cv. 'Durgapura Madhu' due to different intensities of downy mildew caused by *Pseudoperonospora cubensis* in field conditions

| Treatment | PDI * | Average fruit yield kg/ha | Per cent loss in fruit yield |
|---|---|---|---|
| No spray | 68.75 (56 02) | 2250 | 79.06 |
| Three sprays of Dithane M-45 @ 0.2% at 10 days interval | 38.87 (38.55) | 5625 | 47.67 |
| Four sprays of Dithane M-45 @ 0.2% at 10 days interval | 22.37 (28.22) | 7688 | 28.49 |
| Five sprays of Dithane M-45 @ 0.2% at 7 days interval | 11.87 (20.12) | 10750 | — |
| S Em ± | 0.996 | 432 | |
| C D at 1% | 4.58 | 1986 | |
| C D at 5% | 3.19 | 1382 | |

* Figures in parentheses are angular transformed values

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