
SHORT COMMUNICATION

Epidemiological studies on *Pseudoperonospora cubensis* (Berk. and Curt.) Rostow., the incitant of gherkin downy mildew

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Pseudoperonospora cubensis (Berk. and Curt.) Rostow. causal agent of downy mildew of gherkin or pickling cucumber (*Cucumis sativus* L.) is posing a serious threat to the successful cultivation in country. Therefore, the study of epidemiological parameters has been imperative in developing integrated disease management schedule. The effect of epidemiological factors like temperature and relative humidity on sporangial germination of *P. cubensis* were studied under *in vitro* conditions. Maximum sporangial germination found at optimum temperature 20°C - 25°C and relative humidity 90 - 100 per cent.

Key words: Downy mildew, gherkin, *Pseudoperonospora cubensis*, sporangial germination, temperature, relative humidity

Gherkin or pickling cucumber (*Cucumis sativus* L.) is an exotic vegetable being grown in several parts of Karnataka exclusively for export markets in Spain, Belgium, Australia, Germany, USA etc. Several private organizations in Karnataka are engaged in the cultivation of this vegetable through contract farming. This vegetable is suffering from several economically important foliar diseases like downy mildew caused by *Pseudoperonospora cubensis*, which is posing a serious threat to the successful large-scale cultivation. Since the pathogen disseminates through air, disease spreads very fast. If the high inoculums in the field coincide with favourable environmental conditions crop gets infected at early stage. Hence, it is necessary to study the epidemiology of the disease, in this regard present study has been undertaken to find out the role of temperature and relative humidity on sporangial germination of *P. cubensis*.

The germination of sporangia was studied in different temperatures. Downy mildew infected leaves

of gherkin were brought to the laboratory. Sporangia were harvested with help of small camel hair brush from lower surface of leaves in Petri plate containing sterile distilled water. A drop of spore suspension placed in cavity slides, and incubated at various temperatures namely 5, 10, 15, 20, 25, 30 and 35°C in BOD. The per cent germination was calculated by taking number of sporangia present in microscopic fields. Effect of relative humidity on sporangial germination was studied at different levels of relative humidity which were maintained in desiccators by various proportions of H₂SO₄ with distilled water. The cavity slides containing sporangia are placed in desiccators. Different relative humidity percentage maintained was 15, 20, 30, 40, 50, 60, 70, 80, 90 and 100. The desiccators were then incubated in an incubator at 20°C for 2 h. The per cent germination was calculated by taking number of sporangia present in microscopic fields

Temperature is an important environmental factor which influences the germination of sporangia. As per the results presented in Table 1 the sporangia

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did not germinate when they were incubated at 5°C and germination started at 10°C and reached the maximum (94.73%) at 20°C further increase in temperature that is 25, 30 and 35°C resulted in reduction of germination 87.88, 40.73 and 33.13% respectively. Optimum temperature for sporulation is 15°C with six hour moisture on leaf. Zoospore germinate in less than five hour at optimum temperature of 16 to 22°C (Dixon, 1980). Sporangia germinate and cause infection at temperatures ranging from 15 to 28°C (Cohen, 1981). Maximum sporangial germination of *P. cubensis* occurred at 20°C, which was statistically superior

Table 1 : Effect of temperature on the sporangial germination of *Pseudoperonospora cubensis*

Temperature(°c)	Sporangial germination (%)
5	0.00 (0.00) *
10	30.79 (33.69)
15	73.58 (59.04)
20	94.73 (76.71)
25	87.88 (69.60)
30	40.73 (39.64)
35	33.13 (35.12)
S.Em±	0.19
CD	0.82

* Figures in the parenthesis are arc sine transformed values

to other treatments under *in vitro* studies (Deshrajsharma *et al*, 2003). Relative humidity is an important environmental factor which influences sporangial germination. The different levels of relative humidity were maintained at 20°C. The data presented in Table 2 revealed that there was gradual increase in germination percentage with

Table 2 : Effect of relative humidity on the sporangial germination of *Pseudoperonospora cubensis* at 20°C

Relative Humidity (%)	Sporangial germination (%)
15	11.02 (19.38) *
20	18.16 (25.61)
30	20.09 (26.61)
40	27.73 (31.6 3)
50	33.77 (35.51)
60	40.74 (39.64)
70	53.70 (47.10)
80	69.20 (56.27)
90	89.35 (70.93)
100	94.81 (76.81)
S.Em±	0.09
CD	0.38

* Figures in the parenthesis are arc sine transformed values

increasing per cent relative humidity and reached the maximum per cent germination (94.81%) at 100 per cent relative humidity followed by 90 per cent relative humidity (89.35%). Ullasa and Amin (1988) reported that day temperature between 25°C and 30°C and night temperature between 15°C and 21°C and relative humidity of about 75 per cent were conducive for development of ridge gourd downy mildew.

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