

## Letters To The Editor

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### A BRIEF NOTE ON MICRO-CLIMATIC STUDIES AT COIMBATORE

*Introduction*—The term "Micro-climate" has been defined by Ramdas as "The climatic conditions in the air layers near the ground both in the open and inside various environments". It is evident that each crop will tend to develop its own micro-climate (Ramdas 1951). Further, the micro-climates inside standing crops and orchards will show significant deviations from the micro-climates under open conditions (Kalamkar 1934; Ramdas 1934, 1946; Ramdas, Kalamkar and Gadre 1934, 1935). It has also been noted that the effect of crop on the climate of its locality is influenced by factors like "Convective process in the neighbourhood, plant foliage, vertical and lateral growth development, amount of foliage, plant density, percentage of canopy and cultural treatments such as irrigation" (Gadre 1951). Experimental data are being slowly collected to assess the influence of the crop-micro-climate on the incidence of the pests and diseases.

*Material and method*—The daily micro-climatic data collected at different heights in the crops of paddy, cholam and cotton for three years at Coimbatore have been made use of to study 'the micro-climate' in crops. The method as adopted by Ramdas and his co-workers has been followed. The method consists in analysing the micro-climatic data, at different stages of the crop. The life-period of the crop has been divided into four stages as indicated below—

- I Stage—Till germination is over
- II Stage—Initial growth stage
- III Stage—Completion of growth phase
- IV Stage—Consideration of secondary surface in the case of tall crops like cholam

The weather elements estimated are temperature, relative humidity and vapour pressure. The heights are 1', 2' and 4' for

paddy and cotton and 1', 2', 4' and 8' for cholam, if cholam crop is very tall, observations at 12' are also recorded.

The mean values for temperature, vapour pressure and relative humidity for each stage for the crops grown at Coimbatore, were worked out. Though the observations are recorded daily at 0700 and 1400 hours, the data pertaining to the latter observations only were considered since the difference between these two sets of observations is larger than in the case of the morning observations.

*Main features of the micro-climatic variations.* (1) Paddy—The data collected in the years 1948-49, 1949-50 and 1950-51 appear to be practically homogeneous. So, for the sake of brevity the data collected in 1950-51 are presented in Table 1.

The water standing in the field throughout the life of paddy crop, barring of course the last few days at the time of harvest has a profound influence on the micro-climate of this crop. It is seen that the temperature inside the crop is always lower than that outside at all the three heights, namely, 1', 2' and 4'. By 'outside temperature' is meant the temperature recorded in the nearby observatory at the corresponding heights. In regard to vapour pressure it decreases with height in the crop fields as well as in the open. But relative humidity decreases with height inside the crop and increases outside. It is also noted that both the vapour pressure and relative humidity are higher in the crop field at all heights than what they are outside in the corresponding heights.

(2) Cholam—The data collected in 1949-50 are presented in Table 2. The data collected in the 3 years are almost alike in their general characteristics. The preliminary findings are detailed below—

(a) In regard to temperature, for the first ten days after sowing, there is practically no difference between what it is inside the field and what it is outside. As the crop grows,

**TABLE 1**  
Paddy (1950-51)

|                       | Period                | TEMPERATURE (°C)        |                 |                       |                       |                      |                       |
|-----------------------|-----------------------|-------------------------|-----------------|-----------------------|-----------------------|----------------------|-----------------------|
|                       |                       | 9-9-49<br>to<br>7-10-49 | 26-4<br>8-10-50 | 28-8<br>to<br>5-11-50 | 28-3<br>to<br>3-12-50 | 31-0<br>to<br>1-1-51 | 31-0<br>to<br>29-1-51 |
| Inside<br>the<br>crop | 1'                    | 27.6                    | 26.4            | 28.8                  | 28.3                  | 31.0                 |                       |
|                       | 2'                    | 27.6                    | 26.4            | 28.7                  | 28.2                  | 30.7                 |                       |
|                       | 4'                    | 27.5                    | 26.3            | 28.7                  | 28.2                  | 30.4                 |                       |
| Open                  | 1'                    | 30.2                    | 29.6            | 30.1                  | 29.7                  | 31.4                 |                       |
|                       | 2'                    | 29.6                    | 29.1            | 29.1                  | 29.0                  | 30.5                 |                       |
|                       | 4'                    | 29.1                    | 28.7            | 28.9                  | 28.6                  | 29.6                 |                       |
| VAPOUR PRESSURE       | Inside<br>the<br>crop | 1'                      | 19.5            | 20.2                  | 19.9                  | 17.0                 | 16.1                  |
|                       |                       | 2'                      | 19.2            | 19.7                  | 19.3                  | 16.7                 | 14.6                  |
|                       |                       | 4'                      | 19.0            | 19.2                  | 18.3                  | 16.2                 | 14.1                  |
| Open                  | 1'                    | 18.8                    | 18.5            | 16.5                  | 13.9                  | 13.9                 |                       |
|                       | 2'                    | 18.3                    | 17.8            | 16.1                  | 13.5                  | 13.2                 |                       |
|                       | 4'                    | 18.0                    | 17.5            | 15.8                  | 13.3                  | 12.7                 |                       |
| HUMIDITY (%)          | Inside<br>the<br>crop | 1'                      | 66              | 70                    | 67                    | 59                   | 46                    |
|                       |                       | 2'                      | 65              | 68                    | 65                    | 58                   | 44                    |
|                       |                       | 4'                      | 65              | 66                    | 62                    | 57                   | 44                    |
| Open                  | 1'                    | 59                      | 61              | 52                    | 45                    | 41                   |                       |
|                       | 2'                    | 60                      | 60              | 53                    | 45                    | 42                   |                       |
|                       | 4'                    | 61                      | 59              | 53                    | 46                    | 42                   |                       |

putting forth foliage causing some shade on the ground, the temperature inside the field becomes lower than the outside temperature. The temperature decreases with height both inside the crop and outside the crop. During bright weather at lower levels the temperature inside the crops is always less than the outside temperature. At eight feet height they are either equal or slightly higher in cropfield. The fall in temperature due to heights (1', 2', 4' and 8') is more sharp in the open than in the crop field.

(b) Vapour pressure decreases with height both in the open as well as in the cholam field

(c) Relative humidity increases with height in the open but decreases in the crop.

**TABLE 2**  
Cholam (1949-50)

|                       | Period                | TEMPERATURE (°C)        |                 |                       |                       |                       |                      |
|-----------------------|-----------------------|-------------------------|-----------------|-----------------------|-----------------------|-----------------------|----------------------|
|                       |                       | 3-9-49<br>to<br>7-10-49 | 29-5<br>8-10-49 | 31-4<br>to<br>3-11-49 | 30-4<br>to<br>2-12-49 | 31-4<br>to<br>3-12-49 | 31-4<br>to<br>6-8-49 |
| Inside<br>the<br>crop | 1'                    | 32.4                    | 29.5            | 31.4                  | 30.4                  | 31.4                  |                      |
|                       | 2'                    | 32.0                    | 29.4            | 31.3                  | 29.9                  | 31.4                  |                      |
|                       | 4'                    | 31.6                    | 29.3            | 31.1                  | 29.4                  | 31.2                  |                      |
| Open                  | 8'                    | 31.1                    | 29.1            | 30.5                  | 28.8                  | 31.1                  |                      |
|                       | 1'                    | 32.7                    | 28.6            | 29.8                  | 30.6                  | 31.6                  |                      |
|                       | 2'                    | 32.0                    | 28.1            | 29.2                  | 29.8                  | 31.1                  |                      |
| VAPOUR PRESSURE       | Inside<br>the<br>crop | 4'                      | 31.6            | 27.5                  | 28.9                  | 29.4                  | 30.3                 |
|                       |                       | 8'                      | 31.0            | 27.4                  | 28.8                  | 29.1                  | 29.9                 |
|                       |                       | 1'                      | 19.1            | 19.3                  | 16.0                  | 12.0                  | 19.4                 |
| Open                  | 2'                    | 19.0                    | 19.2            | 15.9                  | 12.7                  | 19.4                  |                      |
|                       | 4'                    | 18.9                    | 19.0            | 15.6                  | 11.6                  | 19.0                  |                      |
|                       | 8'                    | 18.0                    | 18.6            | 15.4                  | 11.4                  | 18.8                  |                      |
| VAPOUR PRESSURE       | Open                  | 1'                      | 17.6            | 18.1                  | 14.4                  | 10.8                  | 19.7                 |
|                       |                       | 2'                      | 17.6            | 17.8                  | 13.8                  | 10.6                  | 19.4                 |
|                       |                       | 4'                      | 17.5            | 17.5                  | 13.6                  | 10.6                  | 18.7                 |
| HUMIDITY (%)          | Open                  | 8'                      | 17.3            | 17.0                  | 13.3                  | 10.4                  | 19.0                 |
|                       |                       | 1'                      | 54              | 56                    | 47                    | 34                    | 58                   |
|                       |                       | 2'                      | 54              | 56                    | 47                    | 30                    | 57                   |
| VAPOUR PRESSURE       | Inside<br>the<br>crop | 4'                      | 55              | 56                    | 46                    | 35                    | 57                   |
|                       |                       | 8'                      | 54              | 55                    | 46                    | 35                    | 55                   |
|                       |                       | 1'                      | 48              | 56                    | 46                    | 33                    | 57                   |
| HUMIDITY (%)          | Open                  | 2'                      | 50              | 57                    | 46                    | 34                    | 58                   |
|                       |                       | 4'                      | 51              | 58                    | 46                    | 35                    | 58                   |
|                       |                       | 8'                      | 52              | 57                    | 46                    | 35                    | 59                   |

It is to be noted that both vapour pressure and relative humidity are correspondingly higher inside the crop than in the open during all phases of the crop except the first ten days after sowing.

(3) Cotton—The nature of variation in micro-climatic condition in the cotton crop is

indicated by the data given in Table 3. It is observed that this crop also behaves just like cholam for the first seven days immediately after sowing. Thereafter there are some variations in the weather elements as indicated below—

(a) During bright weather temperature inside the cropped field is less than in the open. Temperature decreases with height in both the cropped field as well as in the open during the maximum temperature epoch (1400 hours). But the fall is less sharp in the cropped field. During the northeast monsoon period of October to December, the

temperature at all heights (1', 2' and 4') inside the cropped field is higher than the temperature at the corresponding heights in the open. Thereafter, from January onwards the picture is reversed.

(b) Vapour pressure decreases with height in both the environments during all stages of crop.

(c) Relative humidity decreases with height inside cotton field and increases with height in the open.

Vapour pressure and humidity are higher inside cotton field than in open at all heights and during all growth stages of the crop.

TABLE 3  
Cotton (1949-50)

|                  | Period          | 3-12-49 to 31-12-49 |                  |                  |                  |      |      |
|------------------|-----------------|---------------------|------------------|------------------|------------------|------|------|
|                  |                 | 1-1-50 to 4-2-50    | 5-2-50 to 8-3-50 | 9-3-50 to 1-4-50 | 2-4-50 to 6-5-50 |      |      |
| TEMPERATURE (°C) | Inside the crop | 1'                  | 31.5             | 30.6             | 32.9             | 35.7 | 36.8 |
|                  |                 | 2'                  | 30.8             | 30.2             | 32.0             | 35.3 | 36.0 |
|                  |                 | 4'                  | 30.3             | 29.8             | 31.4             | 35.1 | 36.3 |
|                  | Open            | 1'                  | 30.6             | 32.2             | 32.9             | 36.0 | 37.3 |
|                  |                 | 2'                  | 29.8             | 31.0             | 32.0             | 34.7 | 36.2 |
|                  |                 | 4'                  | 29.4             | 30.2             | 31.4             | 34.1 | 35.7 |
| VAPOUR PRESSURE  | Inside the crop | 1'                  | 13.0             | 10.9             | 14.5             | 15.3 | 16.5 |
|                  |                 | 2'                  | 12.8             | 10.5             | 13.8             | 14.6 | 16.1 |
|                  |                 | 4'                  | 12.5             | 10.3             | 13.5             | 14.2 | 15.9 |
|                  | Open            | 1'                  | 10.8             | 10.1             | 13.7             | 14.5 | 15.6 |
|                  |                 | 2'                  | 10.6             | 10.0             | 13.5             | 14.2 | 15.2 |
|                  |                 | 4'                  | 10.6             | 9.9              | 13.3             | 14.0 | 14.9 |
| HUMIDITY (%)     | Inside the crop | 1'                  | 39               | 32               | 42               | 35   | 36   |
|                  |                 | 2'                  | 42               | 31               | 40               | 34   | 36   |
|                  |                 | 4'                  | 39               | 31               | 40               | 34   | 36   |
|                  | Open            | 1'                  | 33               | 28               | 38               | 33   | 33   |
|                  |                 | 2'                  | 34               | 30               | 39               | 35   | 35   |
|                  |                 | 4'                  | 35               | 31               | 40               | 35   | 35   |

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