

## ORGANIC MATTER ADDITION AND ITS NUTRIENT CONTRIBUTION IN CARDAMOM PLANTATIONS

Cardamom (*Elettaria cardamomum* Maton) has its natural habitat in the Western Ghat ranges of Kerala, Karnataka and Tamil Nadu. Under a forest ecosystem, vegetation of any type, whether trees, shrubs or plants, does not suffer from a dearth of essential plant nutrients in the soil. Usually in such a system, nutrient supplies are maintained in a cyclic manner by various means such as fall of leaf litter, pruning of old and dry plant parts, using the weeds as mulches etc. There are unconfirmed reports to show that in a cardamom plantation, 5 to 8 tonnes of leaf litter are received per hectare every year. No information is available on the nutrient value of these organic materials. Hence the present study was undertaken not only to quantify the annual leaf litter collection but also the organic materials added through weeds and pruned plant parts and to determine the nutrient value of such materials.

The study was conducted in the research farm of the Indian Cardamom Research Institute at Myladumpara for a period of three years from 1984 to 1986. Five locations were selected under different shade conditions such as low canopy, tall canopy and mixed canopy. Arrangements were made in each location to gather the leaf litter that had fallen in a unit area of 625 m<sup>2</sup> each by using nylon nets. The leaf litter that collected over the net was removed at monthly intervals and its dry weight recorded. As the normal spacing adopted in the region is 2.5 x 2.5 m (6.25 m<sup>2</sup>) was taken as the unit area for the study. The weeds that grew in that unit area were removed once in an year and its dry weight recorded. The plant that is growing in that unit area was pruned

(trashed in other words) once in an year and the dry weight of the pruned plant parts recorded.

The organic materials (leaf litter, weeded and pruned materials) collected were analysed for nitrogen, phosphorus, potassium, calcium and magnesium following standard analytical procedures as described by Piper (1942) and Jackson (1958).

The monthly collection of leaf litter recorded for a period of three years is computed and the mean values are presented in Table 1. The data revealed that there was substantial fall of leaf litter under all the three shade canopies throughout the year, indicating the evergreen nature of the shade trees.

The annual contribution of the organic materials as leaf litter, weeds and pruned plant parts is given in Table 2 as a mean of three years data. The data show that the litter fall ranged from 4.37 t (under fall canopy of shade trees) to 7.23 t (under mixed canopy) with a mean of 5.5 t/ha of cardamom plantation. Under low shade canopy system 4.90 t/ha of leaf litter was collected. The data collected almost tally with the unconfirmed values mentioned earlier. The overall collection of organic matter ranged from 6.0 to 9.0 t/ha annually.

The nutrient content of the organic matter is given in Table 3. The data indicate that the soil fertility will be well maintained by this phenomenon of nutrient recycling, prevalent in the cardamom ecosystem. However, it has to be borne in mind that the nutrients as

Table 1. Month-wise collection of leaf litter (mean of three years) kg/ha

| Month     | Shade canopy |             |              | Mean   |
|-----------|--------------|-------------|--------------|--------|
|           | Low canopy   | Tall canopy | Mixed canopy |        |
| January   | 476.8        | 573.6       | 897.6        | 649.3  |
| February  | 518.4        | 489.6       | 1020.0       | 676.0  |
| March     | 664.0        | 473.6       | 852.0        | 663.2  |
| April     | 640.0        | 409.6       | 613.6        | 554.4  |
| May       | 537.6        | 412.0       | 503.2        | 484.3  |
| June      | 292.8        | 427.2       | 404.8        | 374.9  |
| July      | 201.6        | 284.8       | 419.2        | 301.9  |
| August    | 248.0        | 200.0       | 387.3        | 278.4  |
| September | 168.0        | 162.4       | 392.8        | 241.1  |
| October   | 222.4        | 232.0       | 445.6        | 300.0  |
| November  | 449.6        | 301.6       | 646.4        | 465.9  |
| December  | 480.0        | 401.6       | 648.8        | 510.1  |
| Total     | 4899.2       | 4368.0      | 7230.2       | 5499.5 |

Table 2. Quantity of organic matter collected (mean of three years), kg/ha

| Shade canopy | Leaf litter | Weeds | Trashes | Total |
|--------------|-------------|-------|---------|-------|
| Low          | 4900        | 92    | 1023    | 6015  |
| Tall         | 4368        | 34    | 2805    | 7207  |
| Mixed        | 7230        | 44    | 1792    | 9066  |
| Mean         | 5500        | 57    | 1873    | 7430  |

Table 3. Nutrient content of the organic matter collected (mean of three years), kg/ha

| Organic matter |                 | N     | P    | K    | Ca    | Mg   |
|----------------|-----------------|-------|------|------|-------|------|
| Low            | Leaf litter     | 87.0  | 3.3  | 30.6 | 75.9  | 28.9 |
|                | Weeds           | 2.1   | 0.1  | 1.1  | 1.6   | 0.9  |
|                | Trash materials | 17.3  | 0.6  | 12.8 | 14.4  | 7.9  |
|                | Total           | 106.4 | 4.0  | 44.5 | 91.9  | 37.2 |
| Tall           | Leaf litter     | 71.0  | 2.5  | 18.0 | 53.8  | 25.2 |
|                | Weeds           | 0.8   | 0.04 | 0.6  | 0.5   | 0.3  |
|                | Trash materials | 37.5  | 1.8  | 21.6 | 47.6  | 20.8 |
|                | Total           | 109.3 | 4.34 | 40.2 | 101.9 | 46.3 |
| Mixed          | Leaf litter     | 124.0 | 4.7  | 49.3 | 116.3 | 43.9 |
|                | Weeds           | 0.4   | 0.03 | 0.7  | 0.6   | 0.4  |
|                | Trash materials | 24.5  | 0.9  | 17.7 | 24.7  | 12.9 |
|                | Total           | 148.9 | 5.63 | 67.7 | 141.6 | 57.2 |
| Mean           |                 | 121.5 | 4.6  | 50.8 | 111.8 | 46.9 |

contained in the organic matter are mainly in the organic form (except in the case of potassium) and should be made available to the crop by the process of mineralisation. As it is well known that the rate of mineralisation is always slow and steady in the forest ecosystem, the nutrients that become available to the crop will be able to sustain only normal growth

with average production. With the advent of using high yielding varieties of cardamom on the increase, it may become necessary to apply fertilisers in order to meet crop requirement of nutrients and to augment production for better management of economy of plantations.

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