

**Issues on Dry Matter Accumulation through Photosynthesis,  
Compared to the Three Types of Bio-phyto-module Type Ad, on Species *Prunus domestica* (Plum), *Malus domestica* (Apple), and *Juglans regia* (Walnut)**

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**Abstract.** Plum, apple and walnut are three species of fruit trees, namely trees, covering a significant place in the horticulture of Romania. Improving the quality and quantity of fruit must become a priority of modern horticulture, so that any new method that contributes to this goal is welcome. The devices A.D. are recognized through numerous experiments conducted. Thus, we choose to experience the effect of these on three species mentioned above, comparing the amount of dry matter assimilated during a day, of each species to the other. The method comprises two harvesting of biological material (leaves), one in the morning and the second in the afternoon. Harvested material is dried and weighed, for finding the values which must be compared. Value analysis restored, with an less significant error, the influence of the three devices used, on dry matter accumulation and on photosynthesis process.

**Keywords:** plum, apple, walnut, bio-phyto-modulators, photosynthesis, influence, error.

## INTRODUCTION

Plum tree is an old species of fruit and is considered a tree of life or hope. In Romania has a relatively large area spread from plain to near the foothills. It is a fruit tree from *Rosaceae* family with fleshy fruit, dark blue or yellow. Trunk heartwood, reddish-brown color, is very tough and waterproof. Sap flows through a light-colored sapwood. Among the most important varieties can remember: 'Haulm fat', 'Early Haulm', 'Stanley', 'Record', 'Diana', 'Centenary'.

Apple is also a plant species of the *Rosaceae* family and comprises between 44 and 55 varieties (trees or shrubs). Fruits are based on a hybrid of different sizes, colors and flavors. Over time appeared some new hybrids suited to certain areas, with different production and quality ('Florina', 'Jonathan', 'Golden', 'Starkrimson', 'Jonagold').

Wallnut is part of *Juglandaceae* family and has an area of spread in the temperate and the mediterranean. That altitude can be met, depending on geographical area, up to 1500-2000m. You can find both in wild flora and crops. The canopy and the trunk is large. Varieties: sorrento, victoria, susita, arms, germisara ([www.gradinamea.ro](http://www.gradinamea.ro)).

The evolution of the modern world lead inevitably to greater and more diversified demand in terms of food. Fruit species is high above the daily mass of the population, both for direct consumption and for use of different preparations. Manufacturers try to increase and diversify the offer to cover a wide spectrum of people (Chira, 2005). Growing of fruit requires a set of rules and methods that can be improved at any time, and without which the enhance of quality and quantity of production is not guaranteed. In this context, must be considered many factors, starting with the establishment of culture and continued throughout its existence: where the orchard to be located, exhibition ground, soil, climatic factors (temperature, light, humidity), varieties suitable, maintenance (agro-soil, grooming, plant protection) (Oprea and Ropan, 2010).

## MATERIALS AND METHODS

Bio-phyto-modulators A.D. have a beneficial effect of optimizing environmental conditions. They can be used both in improving plant and animal life and human life. Optimizing environmental conditions for plant growth and development also contribute to improve the quality and quantity of production. Devices A.D. act on the environment by generating optimal vibration, which, in our case, stimulates accumulation of dry matter in leaves by photosynthesis ([www.viatasienergie.ro](http://www.viatasienergie.ro)). Our experience have been done on three floors in height, at species *Prunus domestica*, *Malus domestica* and *Juglans regia*.

In the experiment we used plant material (leaves) harvested from six individuals (one witness for each species). Individuals are part of an orchard with about 2000 m rectangle, placed on sloping ground, with north-eastern exposition. Their age is about 20 years and the average height is 3.5 m. Distance between two consecutive individuals from which was collected the material is 7 m.

The three individuals on which were mounted devices type AD were divided into three levels. Devices were installed in the middle of the second level.

The devices were placed on individuals at 10.00 am, and harvesting was done at 18.00 in the afternoon. For each level of each individual were taken four samples (leaves), which were cut with a circular piece.

For the determination of dry matter we used an indirect method. Thus, we needed the following materials and devices:

- thermoregulation oven with ventilation;
- aluminum vials with lid;
- glass desiccator lid and hygroscopic substance;
- analytical balance accurate to 0.0001 g.

### How we work:

Samples were introduced individually, in separate vials aluminum. Then cap vials were put in the oven, previously heated to 105 °C, and were left for 60 minutes at 105 °C. After this period of time vials were removed from the oven and placed in the desiccator for 45 minutes. These procedures were designed to reduce moisture samples to a minimum so that the weighing table is constant. (Colceriu *et al.*, 2012).

Each sample was weighed before drying and after drying. Approximately at weighing is 0.0001 g.

## RESULTS AND DISCUSSION

The results obtained from measurements after light exposure are shown in the tables below:

Tables 1, 2 and 3 show that the best results were obtained by applying bio-phyto-modulators DEA + DIEE to apple. At plum significant results were obtained at levels 2 and 3. Combination of DEA + DIEE influenced positive photosynthesis by obtaining a more intense water and minerals cycle for every plant of these two cases. Because of harvesting there is the possibility to be insignificant differences between harvesting in the morning and in evening or to be negative (as at nut). Harvesting was not so homogeneous because foliar cover of trees from the date contains leaves of different sizes and thicknesses.

Tab. 1

The amount of dry matter at three levels witness-witness, individual-individual and individual-witness  
Apple

| Nr. Crt. | Floor  | Witness mass (g) morning | Mass with D.E.A. + D.I.E.E. (g) dimineața | Witness mass (g) evening | Mass with D.E.A.+ D.I.E.E. (g) evening | The difference from the witness |          | The difference between the same individuals |         |
|----------|--------|--------------------------|---|--------------------------|--|---------------------------------|----------|---|---------|
|          |        |                          |   |                          |  | Morning                         | Eve-ning | Individual D.E.A.+ D.I.E.E.                 | Wintess |
| 1.       | Base   | 0.0737                   | 0.0739                                    | 0.0802                   | 0.0874                                 | 0.0002                          | 0.0072   | 0.0065                                      | 0.0135  |
| 2.       | Middle | 0.0593                   | 0.0768                                    | 0.1009                   | 0.0933                                 | 0.0175                          | -0.0076  | 0.0416                                      | 0.0165  |
| 3.       | Top    | 0.1001                   | 0.1052                                    | 0.1004                   | 0.1156                                 | 0.0051                          | 0.0152   | 0.0003                                      | 0.0104  |

Tab. 2

The amount of dry matter at three levels witness-witness, individual-individual and individual-witness  
Plum

| Nr. Crt. | Floor  | Witness mass (g) morning | Mass with D.E.A. + D.I.E.E. (g) dimineața | Witness mass (g) evening | Mass with D.E.A.+ D.I.E.E. (g) evening | The difference from the witness |          | The difference between the same individuals |         |
|----------|--------|--------------------------|---|--------------------------|--|---------------------------------|----------|---|---------|
|          |        |                          |   |                          |  | Morning                         | Eve-ning | Individual D.E.A.+ D.I.E.E.                 | Wintess |
| 1.       | Base   | 0.0942                   | 0.1008                                    | 0.1113                   | 0.0976                                 | 0.0066                          | -0.0137  | -0.0032                                     | -0.0032 |
| 2.       | Middle | 0.1136                   | 0.0934                                    | 0.1114                   | 0.0970                                 | -0.0202                         | -0.0144  | 0.0036                                      | -0.0022 |
| 3.       | Top    | 0.1161                   | 0.1257                                    | 0.1128                   | 0.1274                                 | 0.0096                          | 0.0146   | 0.0017                                      | -0.0033 |

Tab. 3

The amount of dry matter at three levels witness-witness, individual-individual and individual-witness  
Walnut

| Nr. Crt. | Floor  | Witness mass (g) morning | Mass with D.E.A. + D.I.E.E. (g) dimineața | Witness mass (g) evening | Mass with D.E.A.+ D.I.E.E. (g) evening | The difference from the witness |          | The difference between the same individuals |         |
|----------|--------|--------------------------|---|--------------------------|--|---------------------------------|----------|---|---------|
|          |        |                          |   |                          |  | Morning                         | Eve-ning | Individual D.E.A.+ D.I.E.E.                 | Wintess |
| 1.       | Base   | 0.0727                   | 0.0571                                    | 0.0762                   | 0.0555                                 | -0.0156                         | -0.0016  | -0.0016                                     | 0.0035  |
| 2.       | Middle | 0.0695                   | 0.0598                                    | 0.0781                   | 0.0627                                 | -0.0097                         | 0.0029   | 0.0029                                      | 0.0086  |
| 3.       | Top    | 0.0806                   | 0.0756                                    | 0.1009                   | 0.0706                                 | -0.0053                         | -0.0303  | -0.0050                                     | 0.0203  |

Tab. 4

The relative error resulting from determinations at apple

| Nr. Crt. | FLOOR  | WITNESS (%) |         | D.E.A.+D.I.E.E. (%) |         |
|----------|--------|-------------|---------|---------------------|---------|
|          |        | Morning     | Evening | Morning             | Evening |
| 1.       | Base   | 0.1356      | 0.1246  | 0.1353              | 0.1144  |
| 2.       | Middle | 0.1686      | 0.0991  | 0.1302              | 0.1071  |
| 3.       | Top    | 0.0999      | 0.0996  | 0.0950              | 0.0865  |

Tab. 5

The relative error resulting from determinations at plum

| Nr.<br>Crt. | FLOOR  | WITNESS<br>(%) |         | D.E.A.+D.I.E.E.<br>(%) |         |
|-------------|--------|----------------|---------|------------------------|---------|
|             |        | Morning        | Evening | Morning                | Evening |
| 1.          | Base   | 0.1061         | 0.0898  | 0.0992                 | 0.1024  |
| 2.          | Middle | 0.0880         | 0.0897  | 0.1070                 | 0.1030  |
| 3.          | Top    | 0.0861         | 0.0886  | 0.0795                 | 0.0784  |

Tab. 6

The relative error resulting from determinations at walnut

| Nr.<br>Crt. | FLOOR  | MARTOR<br>(%) |         | D.E.A.+D.I.E.E.<br>(%) |         |
|-------------|--------|---------------|---------|------------------------|---------|
|             |        | Morning       | Evening | Morning                | Evening |
| 1.          | Base   | 0.1375        | 0.1312  | 0.1751                 | 0.1801  |
| 2.          | Middle | 0.1438        | 0.1280  | 0.1672                 | 0.1594  |
| 3.          | Top    | 0.1240        | 0.0991  | 0.1322                 | 0.1416  |

Results from tables 4, 5 and 6 shows clearly that there can't be significant errors, because they are very small.

## CONCLUSIONS

Using bio-phyto- modulators improves photosynthesis process. Choosing the optimal bio-phyto-modulators, their range and their combinations should be made only after achieving a sufficient number of experiments.

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