

SOME COMMENTS ON DETERMINING THE LEVEL OF LEAVES

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Abstract. *The article briefly analyzes the comparative characteristics of the methods used to determine the leaf area of plants: classical methods and modern methods, their advantages and disadvantages are revealed.*

Key words: *shadow leaf, leaf level, detection methods, section method, contour method, planimetric method, scanning method, leaf area determination method for mobile applications .*

Enter. Currently, many tools have been developed for automatic determination of leaf area, but their application possibilities are limited. For example, LI-COR devices: LI-3100C or LI-3000C, BIOBASE devices: LAM - A, LAM - B are expensive (around 1200-3000 USD).

The methods proposed in this article allow measurements to be made quickly and accurately enough, and at the same time, it does not require expensive scientific equipment or complex software, which makes it convenient for any researcher faced with the task of measuring the level of a leaf. Determining the area of leaves is a very difficult technique because their shape and size change during the growing season. From this except , leaf plates shape very diverse and them measure difficult Leaf surface area to determine for many method and methods work developed , we analyzed the most used ones during the research and identified some disadvantages and advantages. Below are some of them as an example of a soybean plant.

Currently, there are several ways to determine the leaf area of plants.

1.Measurement method. This method is used for plants with pencil or lanceolate leaves. 10 green leaves are selected from each sample by random sampling and determined by the method of linear measurements of field length (D) and greatest width (III).

Measured of leaves area (S) according to the following formula is :

$$S = D_{cp} \times III_{cp} \times 0,7 \times n ,$$

this where n is measured leaves the number 0.7 - grainy of crops leaf area count coefficient (Moiseev , Reshetsky , 2009).

This of the method disadvantage only cereal and parallel veined plant to the leaves suitable comes [3,4] .

Undoubtedly , received of results accuracy a lot things demand does , from this except , method the majority crops for acceptance to be done possible not

2. **Copy get method** . of the plant each one leaf one character in thickness paper on top of it well done is placed and sharp pencil with around edges on top of it drawing will be released . On paper dropped leaf forms in scissors enthusiasm with cut off is taken and cut off received leaf shape analytical on the scales weighed , weight is determined . That's it with together , like that's it from paper area 1 cm ² has been piece will be cut and his mass too is determined . Under investigation of the leaf area according to the following formula is found

$$S = a * C / b$$

this where a is a leaf of the drawing mass , g; b – square paper mass , g; S – square paper area , cm ² [2].

This method is extensive is used simple and enough in accuracy , however efficiency is low. One leaf level to determine for very a lot work time is spent

3. **Parameters according to leaf area to determine method** . Method leaf shape given of the leaf to configuration very suitable coming some simple geometric shapes - circle , ellipse, triangle and rectangle with to compare based on Method only relatively simple and stable to form have has been plants with at work use can Method simplicity , relatively high productivity , leaves from plants without separation leaves surface to determine ability with separate stands But with that At the same time , it is low accuracy with shows the result [2,10]. (Figure 1)

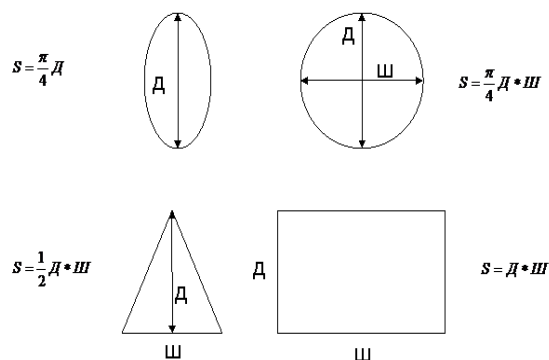


Figure 1. of the leaf level in determining applied some simple geometric forms and their formulas .

4. **Sections method** . This the most comfortable and efficient method , many crops for is used and especially field experiments for valuable is considered His essence as follows : of plants average example leaves are taken quickly will be cut and their wet weight is determined . Leaves are worn on top of each other and known one in diameter with a drill (tube) , each one 5-10 pieces per leaf cross section is prepared . Sections leaf of the plate both by and central veins is located from the part taken need Don't cut diameter leaf of the plate to size and his surface density looking is selected . (Figure 2)

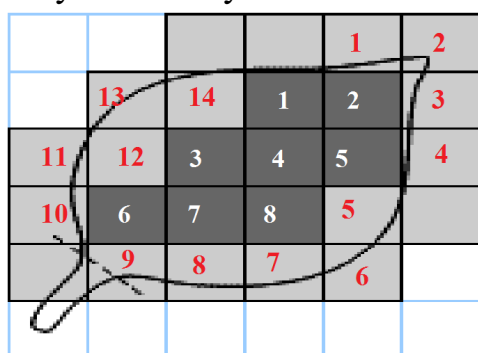
One leaf area with the following formula defined as :

$$S = a * c / b,$$

this where a is general of the leaf mass , g; c - cross section area , cm²;; b - cross section mass , g [2].

this method disadvantage to cuts fell big leaf veins their mass significant level increases . From this except , leaf of the plate different in places received cuts mass of the leaf which in part that looking different thicknesses because of weight too unmatched will be of leaves dehydration too measure to mistakes reason to be can

5. Leaf of the plate contours on graph (checkered) paper drawing method . This method sure , though a lot time demand is enough One of the leaf area to determine for 10-15 minutes goes (to option depending on), therefore for analysis for very a lot work time is spent [8]. (Figure 2)



$$14 / 2 = 7 \text{ cm}^2 + 8 \text{ cm}^2 = 15 \text{ cm}^2$$

A.



B.

2 - picture . of the leaf level in determining applied A - leaf of the plate outlines on graph paper drawing method and B - cuts method .

6. Planimetric method . This method and like most methods only from the plant separated laboratory in leaves conditions performance can An average sample of a leaf sample is weighed and placed on a moving belt of an electronic device - a planimeter. The device gives the leaf area in square centimeters. This method allows you to quickly and accurately measure the leaf area, but most laboratories do not have the necessary equipment to make measurements with this method. [2,5].

were made by weighing paper models, calculating height and width, corrected for leaf shape coefficient, or using mechanical planimeters. All these methods are very laborious and often cannot provide sufficient measurement accuracy.

7. Scanning method. It is based on the use of an optical scanner and subsequent data processing on a computer. Based on determination of leaf area using computer technology. To determine the area of \u200b\u200bthe leaves, you will need the "Listomer" computer program. In this case, the leaf area can be calculated in general and each of them separately. To work with listomer, you need a scanner, transparent film and a sheet of white paper .

8. The method of determining the leaf area using mobile applications.

Petiole mobile application is needed to measure leaf area on a mobile smartphone. The advantage of this method is time saving, sufficient accuracy and the use of graphic papers, and thus there is no need to spend your money on expensive equipment.

Using this program is very simple. You install the free "Petiole" software, select the desired measurements using the "Calibration Paper" and collect data as needed in the field or in the laboratory [11].

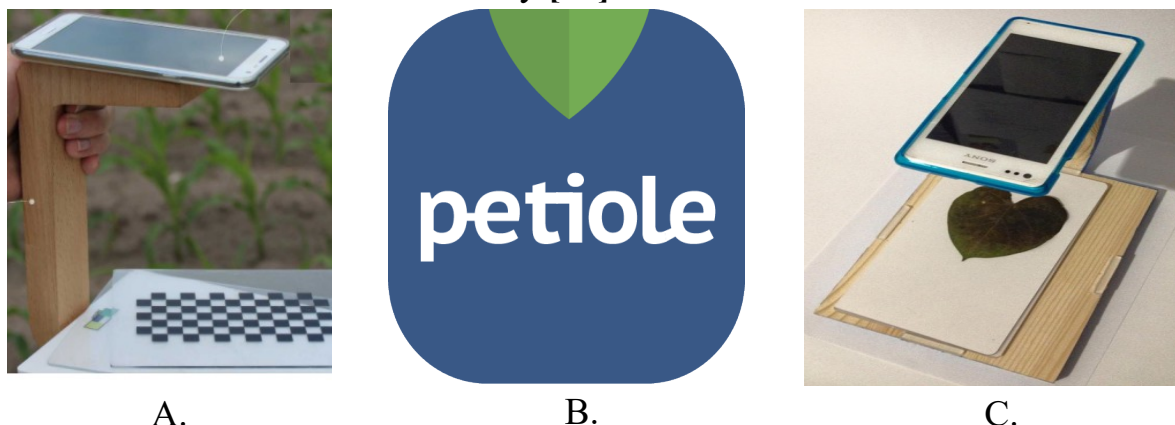


Figure 3. Determining the level of the leaf using the " Petiole " mobile application. (A- Adjustment on calibration paper, B- mobile application, C - leaf level measurement process)

The accuracy and reliability of the result in the above methods were tested in a comparative evaluation with known methods of leaf area determination for the purpose of comparison.

an example , we measured the leaf area of a soybean plant in the double leaf phase.

of leaves in **the Copy Method** was taken as a control (Table 1).

Table 1. Results of measurement of leaf area by different methods.

No	Method	Leaf area of 1 plant, cm ²	Getting out of control	
			\pm cm ²	\pm %
1	Copy method	12.5	-	-
2	Measurement on graph paper - control	13.0	0,5	4%
3	100 cuts by weight	11.9	0.6	4.8%
4	Leaf scanning method	12.8	0.3	2.4 %
5	"Petiole" mobile application	12,6	0,1	0.8 %

From the table apparently like a leaf area copy get in the method measure method and " Petiole " mobile app with measure another to options than better result gives

So " Petiole " mobile from the app used without leaf area to determine recommendation done methods inside very fast and sure analysis to do possibility gives

REFERENCES.

1. Physiology plant. S.S. Medvedev. Izd-vo S.-Peterb. flour, 2004.-336p.
2. Praktikum po fiziologii rastenyi / N.N. Tretyakova, T. V. Karnaukhova, L. A. Paiichkin and dr. - M.: Agropromizdat, 1990. - 271 p.
3. Physiology and biochemistry of plants: method. ukazania /N.P. Reshetsky [i dr.] - Gorky, 2000. - 144p.
4. Tarasenko S.A., Doroshkevich E.I. Praktikum po fiziologii i biokhimii: Prakticheskoe posobie/ S.A. Tarasenko, E.I. Doroshkevich, - Grodno: Oblizdat, 1995. - 122 p.
5. Posypanov G.S. Methody izucheniya biologicheskoy fixatsii azota vozdukha: spravochnoe posobie / G.S. Posypanov. - M.: Agropromizdat, 1991. - 300 p.
6. Fozilov S., Ziyodova M. Maktablarda steam texnologiyasini joriy etishning xususiyatlari va afzalliklari //Biologiyaning zamonaviy tendensiyalari: muammolar va yechimlar. – 2023. – T. 1. – №. 5. – C. 819-821.
7. Fozilov S. The effect of drought on the water regime in the leaves of soybean varieties //Science and innovation in the education system. – 2023. – T. 2. – №. 9. – C. 25-28.
8. Fozilov S. Effect of stress factors on some physiological parameters of soybean plant //Science and innovation in the education system. – 2023. – T. 2. – №. 7. – C. 722-74.
9. Baxriddinova R. U., Musurmonovich F. S. Maktabda tabiiy fanlar, texnologiya, muhandislik, san'at va matematika fanlarini uyg 'unlikda o 'qitishning afzalliklari //nazariy va amaliy fanlardagi ustuvor islohotlar va zamonaviy ta'limning innovatsion yo'nalishlari. – 2024. – T. 1. – №. 4. – C. 259-263.

10. Baxriddinova R. U., Musurmonovich F. S. Oziq zanjiri va oziq to'ri tuzish //nazariy va amaliy fanlardagi ustuvor islohotlar va zamonaviy ta'limning innovatsion yo'nalishlari. – 2024. – T. 1. – №. 4. – С. 264-267.