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FUNCTIONAL DIAGNOSTIC AS PROGNOSTIC METHOD OF CORN FERTILIZATION AFFECTIVITY

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Abstract. *The results of functional diagnostic with corn on meadow-chernozem calcareous soil are showed. The advantages and disadvantages of this type of diagnosis, its comparative characteristics with other accepted methods are describes.*

Key words*: Corn, diagnostics power supply, power supply elements.*

Objective information about the condition of plants in every period of their development is necessary not only to control productivity process, but for crop forecasting, decision of many economic and technical issues associated with harvesting, the formation of prices for products. In such circumstances, become extremely relevant development and implementation of efficient, cost-effective systems for monitoring crops [1, 4, 5]. Comprehensive diagnostics involves regular execution of agrochemical analysis of soil, including the annual spring and autumn) the assessment of the provision of its nitrogen, as well as prompt diagnostics power plants during vegetation [5]. The desired agrochemical and economic effect from the use of fertilizers can be achieved only scientifically rational use. The latter includes the agrochemical analysis of soil and vegetable diagnosis [2, 4].

Functional diagnostics allows to estimate not the content of the element, and the need of plants in it. Availability of nutrients can be set by controlling the intensity of physiological and biochemical processes. Professor A.A.Nichiporovich [6], while studying the parameters of photosynthesis, pointed out the importance of studying and practical use of parameters of photosynthesis. Diagnosis provision of plants nutrients for fotochemistry chloroplasts described by B.A.Yagodin and O.S.Pleshkov in 1982. [6]. It is known that photosynthetic function depends on the conditions of growth and development of plants. The photosynthetic apparatus is enough labile system that responds to changes in external factors cultivation, leading to changes in the intensity of its functioning.

In 2011-2012 we conducted approbation of this method of diagnostics in crops of corn, in experience on meadow-chernozem carbonate soil. The scheme of experiment included the study of the growing norms of nitrogen. Diagnostics was

conducted in phase 5-6 leaves, which is recommended for fertilizing, and during the passage of which is laid elements productivity (formed panicle and the beginning). Experience involved the study of the influence of growing norms of nitrogen fertilizers on the background of the same background phosphoric-potash fertilizers according to the scheme: 1) Without fertilizers (control); 2) $P_{90}K_{90}$ (background); 3) Background + N_{60}; 4) Background + N_{120}; 5) Background + N_{180}; 6) Background + N_{240}; 7) Background + N_{360}. The area of accounting plot - 25 m2, experiment was repeated 3-single. To make fertilizer ammonium nitrate, superphosphate granular potassium chloride. norm fertilizers $N_{120}P_{90}K_{90}$ is recommended for soil and climatic conditions of the experiment.

The method of functional diagnostics is based on change of photochemical activity suspension of mitochondria sheet item, and then with the addition of the element, which is investigated. During the analysis of the average sample leaves confiscate the chloroplasts. the suspension of mitochondria add dye blue 2,6-dichlorfenolindofenol and determine the optical density of a solution of the photokolorimert (D1). After the suspension of light, resulting in a molecule of chlorophyll comes to the active state, and activating the processes of photosynthesis. During the lighting dye, as a result of photochemical reactions, restored with the formation of colorless compounds. Such changes is fixed with the change in the optical density (D2). The same thing is repeated, but with the addition of suspension of mitochondria a particular element of power. Chloroplast photochemical activity is the difference D1 - D2. In case of an increase of photochemical activity suspension of mitochondria, compared with the control (without adding further elements)make the conclusion about the necessity of the element, with a decrease - on the excess, and the activity equal to control its optimum concentration in the nutrient medium.

Figure 1 shows the presentation of results. Red marked the control of determination (without adding the element), which connect the line. If the rate of chloroplast photochemical activity goes beyond that line to the right, then there is a need in the element. If the offset to the left from the line " there's no need or have a surplus element in a plant.

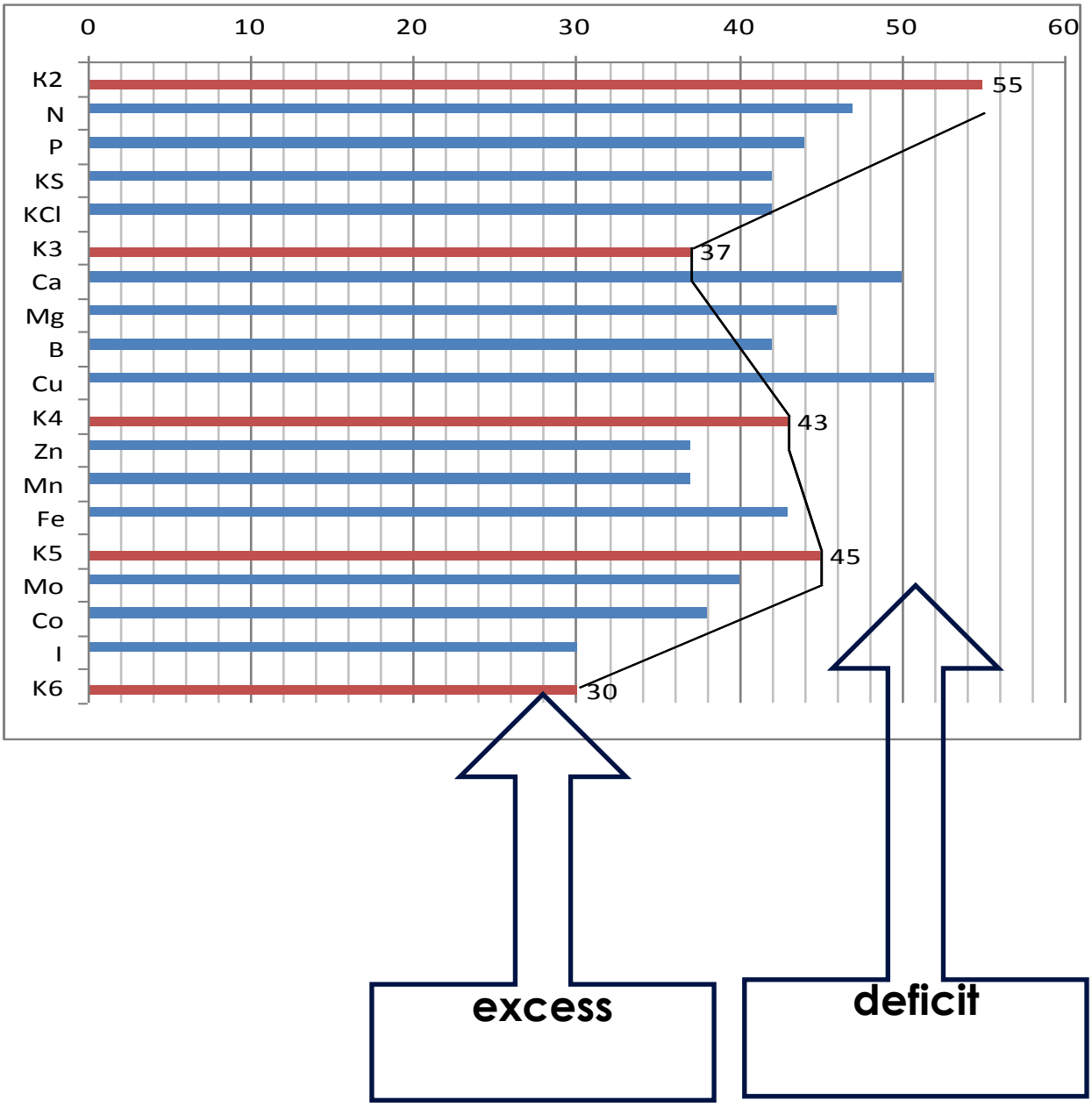

Figure 1. The results of functional diagnostic power plants

Taking the level of chloroplast photochemical activity in the control of 100%, determine the increase or decrease in the activity of chloroplasts with the addition of the element, and on a scale make a conclusion about the changes in the norms of the elements in the direction of increasing (in the field) or decreasing (which is possible with the use of hydroponics). However, the decision to change the rules recharge take, given the availability of moisture as well as the phase of growth and development of plants.

Our data (table 1) show a deficit of calcium in almost all variants of experience. However, a valid explanation for this phenomenon we have not found, because soil of the experimental plot is meadow chernozem carbonate, and therefore

lack of calcium is questionable. Besides, in the method of diagnostics for stabilization of chloroplasts uses a powder $CaCO_3$, which also gives grounds for doubts about.

1. The results of functional diagnostic ensure maize plants batteries

Variant of the experience	N	P	KS	KCl	Ca	Mg	B	Cu	Zn	Mn	Fe	Mo	Co	I
Without fertilizer (control)	-	-	-	-	+	+	-	-	-	-	-	-	-	-
$P_{90}K_{90}$ (background)	+	-	-	+	-	-	-	-	-	-	-	-	-	-
Background + N_{60}	-	-	-	-	+	+	-	-	-	-	-	-	-	-
Background + N_{120}	-	-	-	-	+	-	+	-	-	-	-	-	-	-
Background + N_{180}	-	-	-	-	+	+	-	+	-	-	-	-	-	-
Background + N_{240}	-	-	-	+	+	-	-	-	-	-	-	-	-	-
Background + N_{360}	-	-	-	+	+	-	-	-	+	+	+	+	+	-

*Provided options that detected the lack of a specific element

Nitrogen deficiency noted in variant with application of phosphorus-potash fertilizers, due to the close synergy that exists between the ions of nitrogen and phosphorus. For the application of nitrogen fertilizers even half the norm deficit was not determined. Phosphorus and sulfur Plants have been provided in all variants of experience. Potassium deficiency is manifested for the introduction of high standards of nitrogen. It is known about the interaction of potassium and nitrogen, and the relationship between them should be about 1/1 - 1/2. For a significant increase norms of nitrogen deposition ratio decreases, which leads to the deficit. Magnesium deficiency in some scenarios, it is possible to explain antagonism which exists between magnesium and calcium, because soil is carbonate.

Nitrogen deficiency noted in the version with application of phosphorus-potash fertilizers, due to the close synergy that exists between the ions of nitrogen and phosphorus. For The application of nitrogen fertilizers even half the norm deficit was not determined. With the growth of the norms of nitrogen we began to record a deficit of microelements, which is manifested for making the greatest amount of nitrogen fertilizers. It is known that trace elements are activators of enzymes, particularly those that participate in the metabolism of nitrogen. To improve its standards of microelements is not enough to pass metabolism.

Consequently, the use of functional diagnostics allows you to quickly (within 1 hour) to determine the need of plants in 14 macro - and micronutrients. However, in our opinion, the use of this method of diagnosis requires knowledge of the complexity of the interaction between ions on entry to the plant and can be correctly used only in conjunction with other diagnostic methods and well-grounded in knowledge on physiology of nutrition of plants.

References

1. Binford G.D. Relationships between corn yields and soil nitrate in late spring / G.D. Binford // Agron. J. – 1992. – Vol. 84. – P. 53–59.
2. Coury L. Conductance measurements. - Part 1: Theory / Lou Coury // Current Separations. – 1999. – Vol. 18:3. – P. 91-96.
3. Nutritional disorders of plants: development, visual and analytical diagnosis / Ed. by Werner Bergmann. – Jena; Stuttgard; New York: G. Fisher, 1992. – 741 p.
4. Tserling V.V. Diagnosis of crop nutrition / V.V. Tserling. - M: Agropromizdat, 1990 – 235 p.
5. Shadchina T. Scientific fundamentals of remote monitoring crops of grain /T.M. Shadchina. - K.: Phitocentre, 2001. - 220 p.
6. Yagodin V.A. Agrochemistry / V.A. Yagodin, P.M. Smirnov, A.V. Peterburgskiy: ed. by V.A. Jagodin. - M: Agropromizdat, 1989. - 639 p.