THE INFLUENCE OF VARIOUS TECHNOLOGICAL LINKS ON CEREAL AND CEREAL DERIVATIVES PRODUCTION AND QUALITY

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Abstract: *At the present moment, the production growth in field crops is insured by combining three important factors: the biologic factor, that is the soil or the grown hybrid and the seed, the zoning factor, that is the plant distribution in those areas where were the best vegetation conditions can be found, the crop technology factor, that is the rotation, the fertilizers, the soil works, sowing, density, plant protection etc. Soil working refers to those works which are applied to agricultural land, with various tools or equipment in order to create a favourable environment for plant and useful microorganism culture development in the soil and in the surface soil. Soil works carried out in harmony with other vegetation factors, intend to maintain and multiply soil fertility and the direct agricultural production process, so as to obtain favourable economic results and quality products. Soil works represent human interventions which are meant to create optimal crop development conditions, since they have a reduced capacity to insure low soluble nutrients, in accessible shape and their productivity is exposed to environmental (climate, soil etc.) fluctuations. The plant chemical composition reflects mainly biological characteristics, which are formed in time, with regards to the environment. Larger plants contain 70-72% sweet water, 25 - 27% organic and mineral substances. Nutrition is the supply of nutrients and plants, their assimilation and transport to synthesis spots. Nutrients are those chemical substances which are assimilated by the plant and used, directly or indirectly, in smaller or higher degree, in the photosynthesis and other physiologic processes. Processes through which nutrients are assimilated in various organic and inorganic structures, or used for energy, are called metabolic processes.*

Key words: *seed, sowing, fertilizing, plant care, productions, quality, nutrients*

INTRODUCTION

In field plant crops, the seed quantity used per hectare, the sowing method, must insure a uniform plant distribution and optimum plant density. Thus, a too often sowing will determine the so-called etiolating phenomenon due to the lack of light, it sensitizes plants when falling and when attacked by diseases and pests. Experiments with different plant densities in wheat crops, carried out at the Agrothechnics discipline at the Faculty of Agriculture in Timişoara have highlighted the low resistance to falling and increased disease attack (Erysiphe and Fusarium), in variants with over 600 sproutable grains per square meter.

The soil represents the natural body from the land surface, which contains live matter and can insure plant growth. The fundamental soil characteristic is that of being the plant life environment and of making vegetal production possible. This essential quality is due to the fact that the soil is a physical, chemical and biological dynamic environment, which insures a set of conditions necessary to natural and cultivated vegetation growth, constituting plant support, root development space, water and nutrient source etc.(PUIU ŞT., 1980 QUOTED BY MANEA DAN 2007). By soil works, one understands those works which apply to agricultural land, carried out with various tools or equipment, in order to create in the soil or at its surface most favourable environment for crop plant and useful microorganisms (LĂZUREANU A., 1994).

Soil work importance is rendered by their favourable influence on physical, chemical and biological soil characteristics. Soil works insure to a high degree weed, disease and pest

control in crops, as well as insuring drainage for soil with excess humidity, they incorporate organic and mineral fertilizers in the soil, amendments and volatile herbicides.

Thus, the fundamental purpose of carrying out soil works is, on one hand, obtaining large, clean and constant productions, and on the other hand, preserving and improving soil fertility, without damaging ecosystems and the environment.

MATERIAL AND METHODS

For this paper we completed bibliography studies, observations and field determinations. We studied:

- ✓ sowing depth;
- ✓ sowing density influence
- ✓ used seed quantity;
- ✓ seeding period;
- ✓ used care works
- ✓ soil works;
- ✓ nutrition

RESULTS AND DISCUSSIONS

In order to obtain positive results from a quantitative as well as qualitative point of view for the cereal production, a main measure which must be undertaken is that seed and sowing should respect optimal quality conditions.

In field plants the seed quantity used per hectare, the sowing method must insure a uniform distribution and an optimal plant density. Thus, a too often sowing determines the so-called etiolating phenomenon, due to lack of light, sensitizes plant to falling and disease and pest attack. Experiments with various plant densities in wheat cultures, carried out at the Agrotechnics discipline of the Faculty of Agriculture in Timişoara have highlighted the reduced resistance to falling and increased disease attack (Erysiphe and Fusarium), in variants with over 600 sproutable grains per square meter.

Too rare sowing is also not recommendable, because it favours the growth of weeds which, then shade and inhibit the normal growth of crop plant. In both cases, crop production decreases a lot. Agricultural practice proved that each species, variety or grown hybrid, has a specific optimum regarding the density and it must be respected (LAZUREANU, A., 1994).

In order to receive more light, grown plant rows must be oriented from north to south. During all experiments following various areas and with various plants, the highest productions were obtained with plant rows oriented from north to south, in comparison to rows oriented from east to west. In oat sowed in further rows, of 60cm, 40cm, 20cm, oriented from north to south, in comparison with those oriented from east to west, a seed harvest increase of 7.7%, 6.7% respectively and 2.1% were obtained.

A slight aeration indirectly influences the reduction of the root system, and directly influences it by decreasing root water permeability. Corn in a soil which is not aired, assimilated nutrient elements in smaller quantities in the following order: K, Ca, Mg, N, P.

In aired soil, corn assimilated, after K, more nitrogen and less calcium.

Aeration influence on crop plants is high. Thus, corn grown in unaired conditions resulted in a 6192 kg production per ha and 9767 kg per ha with artificial aeration, registering a difference of 3575 kg per ha, meaning a 58% harvest increase.

Thus, in order to be accepted for sowing, the wheat seed must pertain to an area variety, originating in acknowledged crops, with high biological value, minimal physical purity

of 98%, minimal germination of 90% and a MMB as high as possible. Plants resulted from large seeds shape their tillering node deeper, are better rooted, and resist better go lower temperatures. The sowing period greatly influences the future harvest, since it leads to a better autumn plant tillering, as well as to the accumulation of deposit substances necessary for the cold season and a good resistance to overwintering.

Early seeding are not favourable because:

- plants grow too vigorous and become sensitive to low temperatures;
- the tillering node shapes closer to the surface, which sensitizes them to frost;
- a Hessa fly and autumn aphids attack may occur, leading to high losses in very dry autumns;
- crops are exposed to weeding;
- early crops are predisposed to falling, mildew and rush;
- thigh autumn temperatures determine physiological disorders which lead to growth stops, height reduction in springtime;
- plant withering and death;

Delayed sowing also lead to crop losses due to:

- plant overwintering in conditions of weak tillering, not being adapted to unfavourable winter conditions;
- plants are sensitive to frost, and in springtime they are sensitive to uprooting;
- delay in vegetation;

GH. ŞIPOŞ (1977) appreciates crop decrease by 30 – 50 kg/ha per each sowing delay day in October, and 60 – 100 kg/ha per each sowing delay day in November.

Plant density. Normal productions are obtained when at harvest 500 – 700 ears /m2 are insured. This number insured by sowing 400 – 600 sproutable grains/m2, depending on soil tillering capacity.

The upper grain number limit will increase by 5 – 10 % in the following situations:

- draughty autumns with dry soil;
- germinative bed prepared negligently;
- exceeding the optimal sowing period;

The seed quantity, depending on its biological value, purity, MMB and density ranges between 200 – 250 kg /ha.

The distance between rows is of 10 – 12.5 cm. sowing in close rows at 6 cm will only be carried out in fields lacking vegetal waste and with a good grind ratio.

These last years, many countries generalised the method of sowing with colour (paths) not seeded at a working distance of the working equipment used in vegetation for fertilizing, herbiciding, treatment for disease and pest control. Thus, one avoids using markings; the works are carried out without overlapping or uncovered areas and without plant destruction.

The sowing depth is established depending on the soil type and texture, water supply while sowing and germinative energy, ranging from 4 – 7 cm. Under good humidity conditions sowing will be done at 4 – 5 cm, and in dry soils at 6 – 7 cm, in varieties with long coleoptiles.

Care works. Rolling after sowing is a compulsory work when sowing is done in dry land, in order to put seed in contact with the soil and to facilitate water ascension to the seed. on acid soils, especially in the case of fresh ploughs, a production increase of about 200 kg/ha was obtained through rolling, (COJOCARU C., BORCEAN I., 1971), coordinated results and other research mentioned inside and abroad.

Execution of channels for the evacuation of excess humidity is carried out right after sowing, on all soils in danger of water puddling over sowings and plant asphyxiation.

In cases when frost and defrost alternations lead to uprooting (braking of roots and uncovering of the tillering node), crop rolling is necessary in order to connect the node with the soil so as to grow new roots. „Uprooting" must be prevented by timely sowing in an organized furrow. The work is carried out with a smooth roll, as soon as one can get into the field.

Weed control. Damage caused by weed, if not efficiently controlled range from 10 – 20% and can go up to 60 – 80 % of the harvest (ŞARPE ET AL, 1981). Control is firstly insured by crop rotation. The best results are obtained with combined herbicides thus allowing for a wider control spectrum.

Crop irrigation. GH. BÎLTEANU (1984) synthesised the results regarding wheat irrigation in our country, mentioning that in the area Fundulea – Brăila, the harvest increase was of 19 – 25%. During research in the Mărculeşti Mountains, in draughty years, the increase was of 54 – 336%, and in earlier time's normal precipitations, between 5.5 – 23% (GH. MORARU, 1986).

Soil works: ploughing, harrowing, work with the cultivator, follow various grounds in the production process, one of the purposes was to prepare the air from the soil.

By correctly applying soil works, the soil compaction by agricultural equipment is avoided, contribution to a normal aeration, an essential condition for the root system development and for microorganism activity. (LAZUREANU, A., 1994).

Research by IULIU COLIBAŞ and contributors from the Agricultural Research Station Oradea (1987) have shown that density values of an aired soil, as compared to a compacted one, have dropped from 1.52 to 1.37 g/cm3. In such aired soils, good conditions for plant growth are created, corn productions increasing by 16.7-27.6 g/ha, and wheat productions by 20.3 to 25.8 g/ha as compared to the same crops on compacted unaired soils.

In an aired soil, the air penetrates easily, increasing the oxygen content. Numerous microorganisms from the soil use the oxygen for organic substance oxidation, in order to produce CO2 and necessary energy. This group includes aerobe heterotrophic bacteria which decompose organic soil matter in simple compounds such as: CO2, NH3, SH2, Ca, Mg, Fe, etc. The larger oxygen quantity from air soils intensifies nitrification processes, and the more intense microorganism activity can be judged by the nitrate content.

Autumn furrows, harrowing, disking, work with the cultivator etc. contributes to diminishing the pest biologic reserve which spend part of or their entire development underground (white worms, wireworms, grey worms, mole cricket etc). Pests are destroyed either directly through machine activity, or indirectly by modifying the microclimate and the vegetation, which influences their development in a non-favourable way. Similarly, soil works create conditions which facilitate plant development, which in many cases makes them more tolerable to pest attacks.

Regularization of the water regime and the increase of total aired soil porosity influence the air content of the soil, the soil gas exchange, useful microfauna and microflora development. All these positively influence agricultural plant development. Data supplied by the specialty literature show that deep soil aeration works increase straw cereal crops by 10-18%, corn by 20-25% etc.

Nutrition represents the process of supplying plants with nutritive elements, their assimilation and transport to synthesis spots.

By nutritive element we understand the chemical element which is assimilated by the plant and is directly or indirectly used, in smaller or higher degree, in the photosynthesis or other physiologic processes. Processes through which nutritive elements are introduced in

diverse organic or inorganic structures, or used for energetic purposes, are called metabolic processes. The totality of metabolic processes which participate in plant growing, development and life cycle ending is called metabolism (BUDOI, 2004).

Depending on the role fulfilled within the metabolism, nutritive elements are classified as:

1. Essential elements, indispensible to plant growing and development: C. O, H, N, P, K, S, Ca, Mg, Fe, Mn, B, Zn, Cu , Co, Mo.
2. Unessential elements, while their presence may facilitate plant growing and development, their absence does not hold distinguishable effects: Rb, Na, Si, Br, F, I, Ni, Sn, Sr, W, V, a. o.

During the annual vegetation cycle, there are more characteristic phenostages by differentiate nutritive element consumption:

- vegetative growth phenostage: during this phenostage the creation of new tissues takes place, the most consumed element being nitrogen;
- fructification phenostage: this phenostage includes blossom and fruit growing, the highest demands being those for phosphorus and microelements Zn, Cu, Mn, B, Mo;
- Maturation phenostage: during this phenostage the accumulation of deposit substances takes place in fruit, seed, bulbs, wood mass, and the necessary substances for launching a new life cycle. Highest demands are for K and B.

During the life cycle, another characteristic which changes with age is nutritive substance consumption and sensitivity to the presence or absence of certain nutritive substances from the environment. In connection to this, three consumption periods are distinguished during the plant's life.

CONCLUSIONS

These few examples highlight the fact that production increasing measures must be balanced, since one measure cannot replace another. Thus, for example, irrigation cannot be efficient without the use of corresponding fertilizers. Herbicides cannot replace the positive effect of crop rotation and soil works. Deep soil aeration, without chemical and organic fertilizers, does not have the desired effect.

Similarly, the usage of a seed mass in sowing, which does not correspond, from a physiologic point of view, is not area oriented and is not seeded in optimal conditions of temperature, humidity and germinative bed preparation, is not advisable due to significant loss regarding obtained production quantity as well as quality.

Correct application of fertilizers, irrigation and works cannot result in a maximum production unless there are varieties and hybrids of high genetic potential. Possessing a good knowledge of the interaction between factors, by combining various agrotechnical methods, the agricultural specialist can manage the factors to facilitate production, opening the perspective of achieving maximum productions per surface unit.

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