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THE EXPERIMENTAL FIELD, THE BASIS OF SCIENTIFIC RESEARCH IN AGRICULTURE

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Abstract: *Scientific research in agriculture generally aims to increase the production quality yield and has as its basis the experimental field in which the results performed in the laboratory or in other conditions receive confirmation of the experiments performed in the field under natural conditions. The permanent character of the scientific research in agriculture allows the obtaining of new varieties of more productive, superior quality plants and the necessity to experiment and to introduce in production new specific technologies. The experimental field is an effective means of guidance for production specialists. It has an educational significance, because those working in agricultural production can be convinced of the effectiveness of the latest developments in the field of agricultural sciences through practical demonstrations. The selection of the field for the experimental field is made in ecologically representative areas for the group of species or varieties of study. The soil should be homogeneous and uniform in terms of relief and profile, elements which ultimately determine the uniformity of fertility. Considering that the uniformity of the soil in the experimental field is the main condition for obtaining quality results, the researchers must pay special attention to it, even resorting to the practice of "recognition cultures" or the "blind experiments" method.*
Keywords*: experimental field, experimental parcel, field experience, rotation*

1. INTRODUCTION

Field experiments called "***comparative cultures***" are carried out in experimental fields and represent the most efficient means of studying the different phenomena or factors that allow the improvement of the production results. These experiences are carried out in conditions very close to those of the production cultures, and the results obtained allow the elaboration of conclusions and recommendations with direct and immediate applications in production. For the agricultural practice, the experiences in the experimental field are of particular importance because they provide the cultivators with valuable information regarding the degree of applicability of the research results for the respective area, on the value of genotypes, control substances, culture technologies etc. Because the experimental results are affected by the influence of the pedo-climatic factors, the experiments must be carried out in each zone or ecological micro-zone, because the soil and their climate have obvious differences and in order for the results to be valid they must be obtained under the respective climatic and soil conditions.

An experiment in the experimental field consists of the experimental parcels that must be observed and harvested separately, the experimental parcel being the basic element of an experimental field. Each experimental parcel of an experimental field represents a "***variant***", because on each parcelone can cultivate and follow a certain variety. Each variant of an experiment is repeated several times, so that the same experimental parcel will be found in the experience several times. Experimental parcels or variants occupied by the same variety are called "***repetition parcels***". The term repetition is used to denote all parcels comprising all the variants once.

The group of parcels occupied by different variants belonging to the same repetition and horizontally linked are called "***block***". When parcels are vertically aligned, the group of plots is called a "***column***". Each block or column is bordered by the protection parcels necessary to prevent experimental plots from the influence of the edge caused by alleys or roads. Apart from the protection parcels, each experience in the experimental field is surrounded by the "***protection band***", the size of which corresponds to the width of at least two passes of the sowing machine to the crops sown in thick rows and to the width occupied by at least 8 -10 rows of pruning plants.

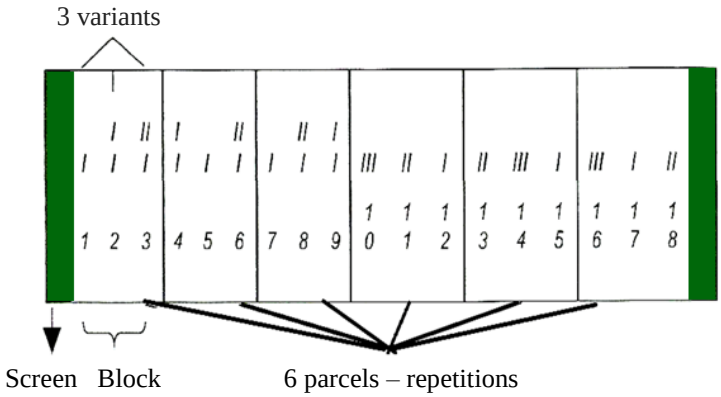

Figure 1: The components of a field experience

2. MATERIALS AND METHODS

Choosing the field for the experimental field is one of the most important conditions for the success of an experience. Thus, it must meet 3 conditions: be representative, specific and uniform.

a. **Representative:** that means to be located in the climate, the geomorphological unit and on the type of soil characteristic of the area in which the results will be applied. For this it is recommended first of all to ensure a microclimate favorable to a vegetation specific for the culture being experienced. Secondly, the experiences will be located in the same geomorphological unit in which the area in which the research results will be applied is located, because each geomorphological unit is distinguished by a characteristic local climate, another groundwater level and often by other types of soil in terms of structure, texture, fertility etc.

b. **Specific**: the experience must be located on a specific land for the culture of the respective plant, both in terms of texture, and in terms of the thickness of the permeable horizons, the depth of the groundwater, etc.

c. **Uniform**: all plots should have a uniform surface so as not to result in a different distribution of water, nutrients, light and heat, with influences on plant development. Also the basement should be uniform without areas with sand or gravel.

For the proper conduct of an experience in the experimental field, the attention must be on its fundamental element which is the "***experimental parcel***". This must meet a number of conditions:

- Equal surfaces for all parcels
- Sowing, respectively planting, should be carried out as evenly as possible on the whole surface
- To include a sufficient number of harvestable plants

In order to meet these conditions, the experimental plots must have a certain shape and size. Thus, the shape of the plots in the experimental field can be square or rectangular, the most suitable being the rectangular form for the following reasons:

- Longer plots include the unevenness of the land both individually and within the repetitions
- Eases sowing, care and harvesting when mechanically executed
- It facilitates comparative culture placement in the field
- They use the land more rationally because the surface removed at the ends of the plots in order to eliminate the influence of the front edge is much smaller than in the square plots

The optimal ratio between the length and the width of the parcels varies between 4/1 and 10/1, being determined by the width of the agricultural machines and the dimensions of the experimental field. The fundamental principle when choosing the size of the parcels is to ensure the possibility of executing all the works as well as in production conditions and to realize the necessary number of harvestable plants after eliminating the influence of the margin and the holes.

The research in the experimental field must be within a rational rotation, appropriate to the respective ecological zone. The experimental field can be fixed, occupying the same land or mobile every year when moving every year on different fields occupied by cultures of uniformity with the respective species. The mobile experimental field has the great advantage of bringing experiences closer to the production conditions of the respective area. It also eliminates the different remaining effects of previous experiences, effects that are much more pronounced in fixed experimental fields. Whatever the experimental field, fixed or mobile, the introduction of the crop rotation is mandatory.

In the case of the fixed experimental field, there are foreseen so many large pieces of field, equal in surface, as many years as the established rotation has. For a 4 year rotation (fig. 2), the entire area of the land destined for the experiences is divided into 4 pieces of filed. Then each of these pieces of filed is divided into as many sub-pieces of filed as many years of culture of uniformity were established to follow after the year of experience,

plus one. If it was established to eliminate, by 3 years of uniformity crops, the fertility differences caused by the different variants and the presence of roads, the piece of land will be divided into 3 + 1 sub-pieces of land.

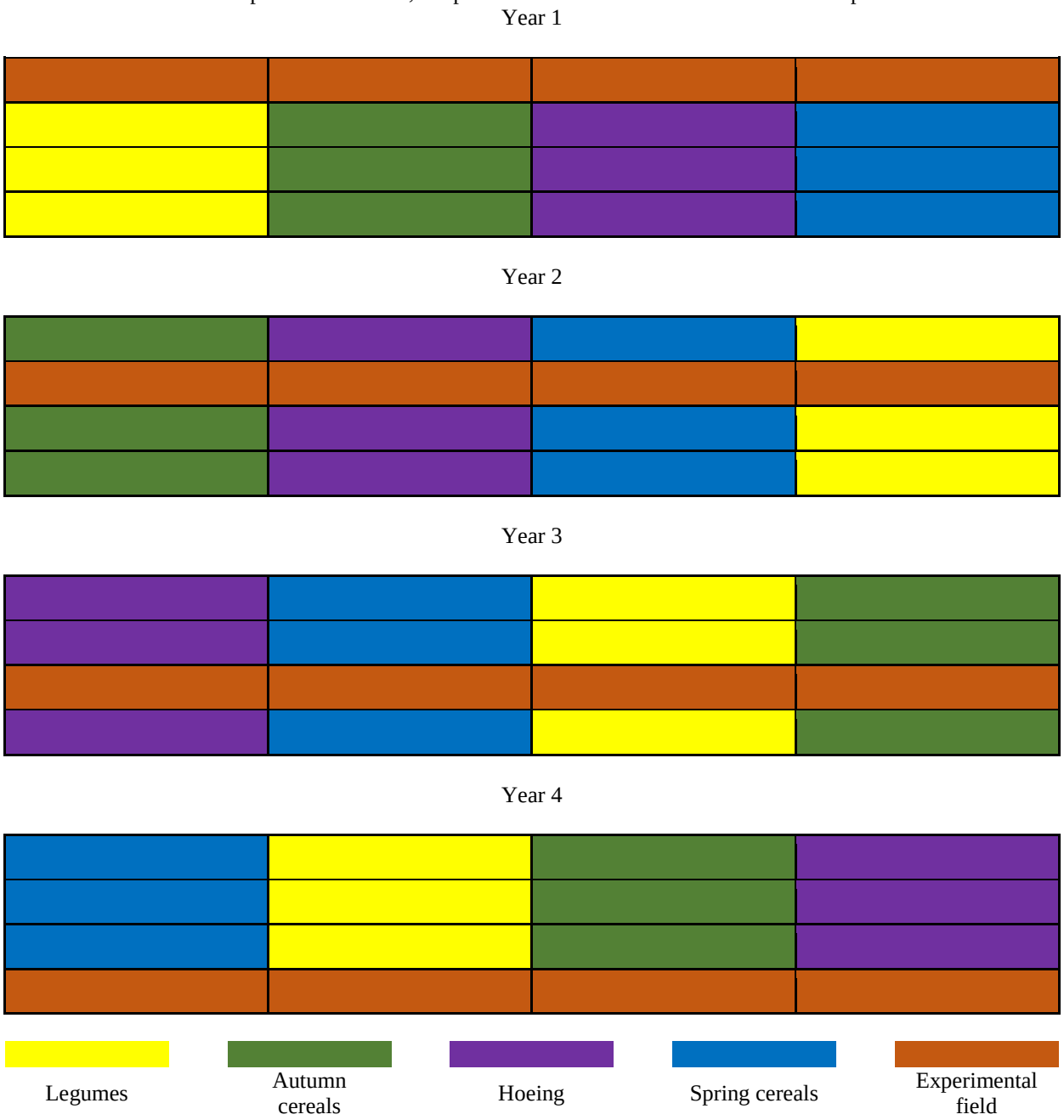

Figure 2: Schematic of a crop rotation with experiences spread over several areas

3. RESULTS AND DISCUSSIONS

In the experimental field, care for the creation of a land without unevenness is essential to achieve uniform conditions of seed germination and of uniform growth and development of all plants. The execution of all the basic works and those preceding the sowing or planting must comply with all the norms, especially those regarding the time and the moment of execution. Thus, the plows for the crops that are sown in the autumn are carried out long before sowing, and the preparation of the land for sowing the spring crops must be carried out as early as autumn. The summer plows are executed with or without prior stubble field and with concomitant excavation followed by other works that contribute to the destruction of at least one generation of weeds. Autumn plows are executed as uniformly at a depth of 25 - 30 cm until August 15 in southern areas and August 30 in northern areas, after precursory harvest in summer and until November 15 after precursory harvest in

autumn. On the heavy soils, once with the plow, a scarification is done once every 4 years. On the impermeable soils, measures are taken to eliminate excess water by alternating from year to year the "***at the mould board***" plow with the "***at the edges***" plow. On sloping lands, additional protection work is recommended after sowing, made by burrs or ditches to drive the excess water out of the experimental field or to protect it from the water from the outside, and on flat lands all measures are recommended to avoid humidity to excess. In order to avoid the formation of holes at plowing, it is recommended to use reversible plows as they do not produce bumps. Any soil work should be performed during the shortest time so as not to be interrupted due to changing weather.

4. CONCLUSIONS

- The experimental field is a tool for research and application of results
- The field preparation works in the experimental field are done more carefully than in the production conditions
- The works with the disc harrow or the cultivator in the experimental field will be performed alternately, oblique and perpendicular to the direction of the plow, and the germinating bed will be prepared differentiated according to the requirements of each crop.
- Excessive soil shredding will be avoided as it may adversely affect the results of the experiments, but no clods which would adversely affect the quality of the sowing or planting will be left.
- For all the preparation work of the field in the experimental field it is recommended not to perform turns on the surface of the field, but outside it to avoid its non-uniformity.
- The experimental field must be located at a distance of at least 100 m from streams, rivers, ditches, pits, canals that would cause a water infiltration.
- The experimental field must be protected from damage caused by humans, domestic animals or wildlife.
- Avoid placing experimental fields on fields surrounded by hearths of heather or pests' nests.

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