RESEARCHES ON THE USE OF TECHNICAL EQUIPMENT IN THE PREPARATION OF THE GERMINATIVE BED IN THE EXPERIMENTAL FIELDS

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Abstract.*The preparation of the germinating bed is the most important link in plant culture technology without which the optimal result in qualitative and quantitative terms could not be obtained. Actually, the preparation of the germinating bed is a secondary work of the soil that is executed after plowing and consists in the fragmentation, crushing of the clod andstructural macro-aggregates of the soil in order to achieve a uniform surface, that is to say, a layer, "loose, well-sharpened and uniform". The work is in fact composed of several operations in relation to the type of soil, the cultivated plant and the technical equipment used. The germination bed preparation works in the experimental fields are performed in similar conditions as in field works but with more attention. These require the rational use of resources and the use of technical equipment that does not cause environmental disturbance. Achieving unprepared land is essential in order to achieve uniform conditions of seed germination, growth and uniform development of all plants. Works must comply with all agro-technical requirements, especially those relating to the epoch and time of execution. The preparation of the germinating bed consists in the mobilization, crushing and loosing of the soil at a depth equal to 1 or 2 cm bigger than the depth of sowing, to ensure conditions of humidity, light and heat for uniform germination and breeding. If these conditions are not met, seed germination and breeding are staggered, resulting gaps in the crop, and there will be great risks for the attack of phytopathogenic agents, resulting in decreased production. The germination bed preparation works in experimental fields are usually executed with disc harrow and agricultural milling, the movements being oblique and perpendicular to the direction of the plowing, in order to obtain maximum uniformity. Avoid excessive soil mowing, which could adversely affect the results of the experiments, but do not leave any bulbs that could negatively affect the quality of the crops. For all ground preparation work, it is recommended not to perform machine overturns on the experimental field surface, but outside it.*

Key words*: germination bed, technical equipment, experimental field, qualitative indices*

INTRODUCTION

For experimental fields where autumn crops will need to be grown and requires a settled land, it is recommended that soil cultivation is done 1-2 weeks before sowing. After early cultures (summer potatoes, grain cereals, etc.), in the experimental fields immediately after their harvesting, the summer plowing is first made in the aggregate with the starred harrow (JITĂREANU,G., 2006).

If, due to the excessive drought, a quality plowing cannot be executed, the dehumidification is made immediately after the harvesting, and after the first rain the plowing is done. Until autumn when the germinating bed is being prepared, the plowing is kept clean by weeds and without the crust by working with disc harrows, agricultural milling machine or with the cultivator in aggregate with tiller with adjustable tilts (POP A.I. ET AL., 2016).

For the experimental fields to be cultivated in the spring, it is compulsory to be executed in the autumn. It is executed as uniformly as possible at a depth of 25-30 cm after autumn harvesting (SĂNDOIU , D.I., 2012).

MATERIAL AND METHODS

Over time, soil technology equipment used both in experimental fields and in agricultural production fields has evolved from hand-drawn or animal-drawn to the present day when high-performance equipment and machinery are used (SĂNDOIU , D.I., 2012).

As a basic energy source for the development of soil engineering equipment in the experimental fields, we use low and medium power tractors built nationally or internationally. The most commonly used tractors models built nationally are the U-302, U-445 and L-445 tractors with the following features:

Table 1

Romanian technical characteristics for tractors used in the experimental fields (CARACIUGIUC, G., ET.AL.,1985), (FARCAŞ, N., BORUGĂ, I., 2003), (DOBRE, P., 2009)

No.	Model	Technical characteristics
1	**U-302** 	• Diesel engine with 2 cylinders • Power: 35 horsepower • Gauge: 820-1320 mm • Speed of travel (km/h): 2,29; 4,13; 6,50; 8,23; 14,47; 23,41 • Mass (no extra weights): 1890 kg.
2	**U-445** 	• Diesel engine with 3 cylinders • Power: 45 horsepower • Gauge: 1280 - 1975 mm - face 1200 - 1900 mm - back • Speed of travel (km/h): 0,74; 1,34; 2,29; 2,29; 4,13; 6,50; 8,23; 14,47; 23,41 • Mass (no extra weights): 1820 kg
3	**L-445** 	• Diesel engine with 3 cylinders • Power: 45 horsepower • Gauge: 1400-1900 mm - face 1200 - 1900 mm – back • Speed of travel (km/h): 0.68; 1,22; 1,93; 2.09; 3,78; 5,95; 7,54; 13,60; 21,40 • Mass (no extra weights): 1850 k

Ground preparation is done using small-scale agricultural machines, as are usually the highly used experimental fields built nationally as shown in the following table with the following technical characteristics:

Table 2

Technical characteristics of Romanian agricultural machines used in the preparation of the germinating bed in experimental fields (FARCAȘ, N., BORUGĂ, I., 2003), (DOBRE, P., 2009). (VEGHES.,V., 1986), (CĂPROIU, ST.,ET. AL., 1982)

No.	Model	Technical characteristics
1	**WORN PLOW PP 2- 30** 	• Number of bodies: 2 • Working width: 600 mm • Depth of work: 150-300 mm • The distance between the bodies: 675 mm • Weight: 275 kg
2	**STARRY HARROW GS – 1,2** 	• Working width: 1200 mm • Number of stars: 42 • Dimensions: length: 1800 mm, width: 1400 mm • Number of axles: 2 • Weight: 180 kg
3	**HARROW (DISKING) DPV - 1,2(1,5)** 	• Working width: 1200 (1500) mm • Working depth: 60-100 mm • Number of batteries: 4 • Number of discs on the battery: 3 (4) • Disc diameter: 460 mm • Distance between discs: 175 mm • Angle of attack: 10˚ - 20˚ • Mass: 285 (320) kg
4	**AGRICULTURAL MILLING MACHINE F – 1,25** 	• Working width: 1250 mm • Working depth: 100 - 150 mm • Number of knives: 36 • Weight: 295 kg

RESULTS AND DISCUSSIONS

In order not to influence the results of the experiments conducted in the experimental field, the qualitative indices of germination bed preparation must be much superior to those in the production fields (JITĂREANU,G.,2006).

Inappropriate preparation of the germinating bed with bumps makes the seed embedded at different depths; the germination is staggered and to appear gaps in the crop (SĂNDOIU , D.I., 2012). As a result, the following agro technical requirements must be met to make a suitable germination bed:

- Loosening and crushing the soil should be done only up to the depth of sowing
- The process of working is done with fewer passes of the technical equipment
- Incorporating uniformly the volatile weeds and herbicides applied

Qualitative indices of germination bed preparation are a set of measurable or determinable sizes with the help of instruments, instruments or measuring equipment (VLAD, C.,2013).These indices characterize the extent to which the required agro-technical requirements have been met. In the case of the experimental field, the minimum values of the working indices for the germination bed preparation are presented in the following table:

Table 3

Minimum values of qualitative indices in germinating bed preparation in experimental fields.(TOMA, D., ET.AL., 1986), (DRUNEK ,J., 2009), (VLAD, C., 2013)

Work Quality Indicators in the Preparation of the Germinative Stay in Experimental Campaigns	Values
Average deviation from average working depth	$d_a^{\wedge} \leq \pm 0{,}10\ a_m$
Maximum deviation from average work depth	$\Delta_a \leq \pm 0{,}2\ a_m$
Standard deviation of work depth	$s_a \leq \pm 0{,}10\ a_m$
Coefficient of variation of working depth	$C_a \leq \pm 0{,}10$
The degree of soil crushing	$G_{ms} > 85\ \%$
Degree of weed destruction	$G_{db} > 95\ \%$
Soil leveling	$G_{as} = 20\text{-}30\ \%$
Level of soil leveling	$G_{ns} > 50\ \%$
Resistance to penetration	light soil: <15 KPa • medium soil:15-50 KPa • heavy soil:50-150 KPa • very hard soil:>150 KPa

where a_m - average working depth of active organs [cm]

CONCLUSIONS

- the experimental field should be placed on a uniform and homogeneous field in terms of relief and profile, elements that ultimately determine the uniformity of the fertility
- the preparation of the germinating bed in the experimental field is carried out in the same conditions as in the case of the works in the field of culture, but with greater care not to influence the results of the experiments
- the return of equipment and machinery used to prepare the germinating bed in the experimental field is done only outside

- qualitative working indexes for germinating bed preparation in the experimental field are superior to those in production fields
- climate conditions in Romania have shown that there is a need for thorough studies on how to prepare the germinating bed and the equipment used to carry out this work in the conditions of obtaining a high quality and quantitative agricultural production but at the same time to conserve and soil resources
- the crushing and soil loosening works are executed alternatively, oblique and perpendicular to the direction of the ridge, and the germinating bed is prepared separately according to the requirements of the crop plant.

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