



**The 3rd International Conference on
"Computational Mechanics
and Virtual Engineering"
COMEC 2009
29 – 30 OCTOBER 2009, Brasov, Romania**

THE PLANTING WILD SEEDLING PLANTS EQUIPMENT

**Dr.ing. Ciupercă Radu, Dr. ing. Nedelcu Ancuta,
Dr.ing. Popa Lucretia, Dr. ing. Ivan Gheorghe**
INMA Bucharest, Romania, e-mail iscit@inma.ro

Abstract: This paper presents an new technology and technical equipement that comes to modernize the forestation technologies used in Romania in view to achieve the strategy for forest durable administration, regarding the importance it has for the environmental protection and for its ecosystems.

Keywords: forest, forestation technologies, environment protection.

1. INTRODUCTION

Forest is a very complex structure, with an essential activity in the nature regeneration. By the seas and oceans, the forest is contributing in beneficial mode to keep the atmosphere gases in favorable percentage for our life. Thus, an forest hectare is fixed annually among 6 and 10 carbon dioxide tones and releases among 12...20 oxygen tones and ethereal oils extremely favorable for the peoples' and animals' respiratory system[5].

Forest have an ecological role, for protect the medium, therefore 50% of Romania's forest are including in the categories for protection of the water, the soil and the clime.

In the regions with fragile soil, the forest plays often a protector role against the erosion produced by the wind and also by the water. In the mountains areas, the forest have a protector role against the natural catastrophes, like avalanches, fall rocks and inundations. The forest realizes also a more temperate climate than those who exists in the uncovered area with a medium lower temperature and a higher humidity.

The strategical actions for the durable administration of the forest are[1]:

- the forestation of the abandoned and degradated areas of the agricultural field;
- the ecological reconstruction of the structural-faulty forest by natural facts;
- the creation of the forest shelter-belt for the field and soil protection and against the erosion;
- the maintenance of the volume of annual crops of wood at the forest level;
- the ecology of the technologies for wood exploitation.

The machines for plant wild seedling plants are characterized on a remarkable complexity in accordance with the constructive and functional principle. The machine realized till now are not equipped with planting device which maintain vertically the wild seedling plant till is done the surface compaction, that subserves the wild seedling plant inclination phenomena.

For the elimination of the mentioned disadvantages, INMA Bucharest has conceived and realized the experimental model of The Planting wild seedling plants equipment MPF.

2. THE PLANTING WILD SEEDLING PLANTS EQUIPMENT MPF

Planting wild seedling plants equipment fig.1, is a carried out or towed type and it is composed of: cradle (1); planting mechanism (2); transport train (3); shovel (4); wetting equipment (5); wild seedling plants box (6); coupling element (7) and a hydraulic installation(8).



Fig.1 – The Planting wild seedling plants equipment

The planting mechanism (fig.2) is the basic subassembly of the equipment. It is composed of a deformable parallelogram (1) provided with two helical springs (2) what readjust the press force of the compaction wheels (3) on the soil.

On the cradle of the deformable parallelogram there are mounted subsystems as: settling wheels (3); transmission (4); the device for wild seedling plants staying (5); wild seedling plants catch element (6) .

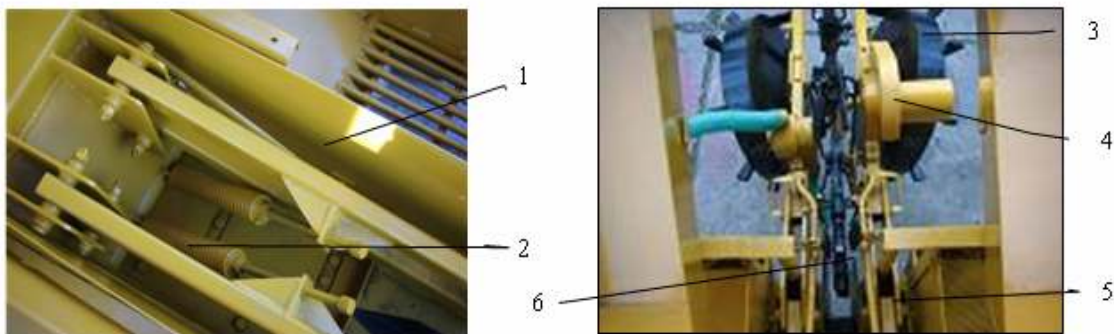


Fig.2 - The planting mechanism

3. FUNCTIONAL DESCRIPTION OF THE PLANTING WILD SEEDLING PLANTS EQUIPMENT- MPF

The working process of the planting wild seedling plants equipment, is develop as in figure 3.

When the shovels have arrived in the processing area, it commands the planting equipment to step down by acting the two lift hydraulics cylinders of the transport wheels.

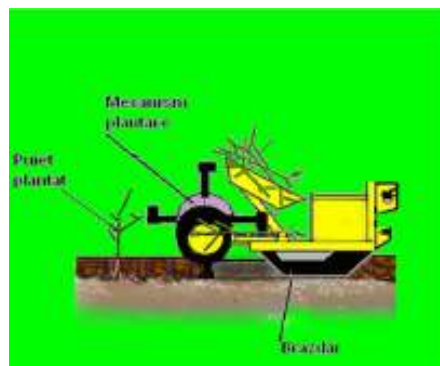


Fig.3 – The working process of planting wild seedling plants equipment

While the transport wheels are risen up, the planting equipment shovel penetrates the soil till gets to the two skates which establish the shovel working depth. From this moment it begins to realize the furrow where the seedling plants will be set down.

The compaction wheels transmit the movement to the planting device, helping a gearing.

In the rotation movement, planting device arms meet one seedling plant on the setting device which is tied from the arms lamella directing it with its root down.

When the seedling plant is in vertical position in the furrow bottom, the soil dislocated by shovel is mobilized with its compaction wheels covering the seedling plant root, its wetting being realized in the same time. Next, the seedling plant is liberated by the planting arm clamp and the compaction wheels press the soil mass round the seedling plant fixing it into the soil. According as the aggregate advances, the next planting arm repeats this operation at the adjusted distance among seedling plant on row.

In accordance with the number of the existing plants on planting device disc, seedling plants will be plant at the different distance on the row as table 1.

Table 1: Planting distance on the row

No crt.	The arms number of the planter (piece)	The planting distance (mm)
1	6	500
2	4	750
3	3	1000
4	2	1500
5	1	3000

4. TECHNICAL AND FUNCTIONAL CHARACTERISTICS

The main technical and functional characteristics of The planting wild seedling plants equipment are presented in the table 2.

Table 2: Technical and functional characteristics

Characteristic	U.M.	Value
Tractor power (min)	kW	35
Working speed	km/h	0,5...3
Maximum planting depth	cm	30
The planting distance on the row	mm	500,750,1000,1500,3000

5. THE TESTS RESULTS

5.1. The Tests place

The Planting wild seedling plants equipment tests, were done inside the laboratories and INMA Bucharest polygon, also on the field from the Forestry Department Giurgiu and at Forestry planting field Valcele-Calarasi, fig 4,5,6.



seedling plants equipment-working
INMA Bucharest

Fig.4- The Planting wild



Fig.5- The Planting wild seedling plants equipment-working
Forestry Department Giurgiu



Fig.6- The Planting wild seedling plants equipment-working
Valcele-Calarasi

5.2 The qualitative index induced for seedling plants equipment – MPF

The qualitative index for seedling plants equipment are presented in the table 3.

The theoretical planting distance =75cm

Table 3: The qualitative index for seedling plants

Nr. crt	Characteristic	Repetition										
		1	2	3	4	5	6	7	8	9	10	
1	Distance between seedling plants on row,cm	77	79	79	75	80	76	75	76	76	75	
2	Maximum deviation in comparison with the theoretical planting distance, Δ_d , cm	3	4	4	0	5	1	0	1	1	0	
3	Variation coefficient of planting distance, C_d , %	2,63										
4	Seedling plant demaging rate during the planting process,%	0										
5	Seedling plant deviation in comparison with row ax within the range, mm	0..... ± 20	-0	10	-	-	-	-	-	-	-	-
		$\pm 20... \pm 40$	-	-	-25	-35	-45	-4	-5	-4	-35	-4
		over ± 40	-	-	-	-	-	-	-	-	-	-

6	Extracting force of seedling plants from the soil, daN	10	8	8	8,5	8	9	8,7	11	8,1	9
7	Planting depth, cm	27,5	28	28	27	28	26,5	26	28	27	30
8	Maximum deviation in comparison with theoretical planting depth, Δ_a , cm	2,5	2	2	3	2	3,5	4	2	3	0
9	Variation coefficient of average planting depth, C_a , %	2,62									

The advantages obtained through the mechanization harmonized technology of the soil working operations in forestry areas are:

- the physical effort is reduced 10 times towards the manually work;
- the mechanization degree of the seedling plants increases;
- the working quality increases, with some low exploitation costs;
- the soil compaction degree is reduced by elimination of some successive works;

6. CONCLUSIONS

The forest plays an special role in the environment and ecosystems protection, about of 50% Romania's forests are framed in water, soil and climate protection categories

These protective effects are manifested against water and wind erosion, natural catastrophes, as avalanches, fall rocks and inundations. The forest realizes also a more temperate climate than those who exists in the uncovered area with a medium lower temperature and a higher humidity and contributes to keep the atmosphere gases in favorable proportions for life.

For the forest durable and efficiency handling on impose strategic actions, as:

- the forestation of the abandoned and degraded areas of the agricultural field;
- the ecological reconstruction of the structural-faulty forest by natural facts;
- the creation of the forest shelter-belt for the field and soil protection and against the erosion.

In these conditions INMA Bucharest has conceived and realized the experimental model of The Planting wild seedling plants equipment – MPF which realizes adequate working parameters, in the planting technologies conditions used by beneficiaries, as:

- Maximum planting depth, 30 cm;
- Variation coefficient of average planting depth, 2,63 %;
- Variation coefficient of average planting depth, 2,62 %;
- Seedling plant damaging rate during the planting process, 0%;
- The planting distance on the row; 500-3000.

REFERENCES

- [1] Forest Ministry - 1987 Technical directions for compositions, schedules and foresting regeneration technologies. The editorial staff for the agricultural technical propaganda.
- [2] Ilie Popescu. – 1984 The mechanization of forest works. Ceres Publishing house.
- [3] Mircea Radu – 2005: Study: The scientific technical basic of innovative technologies for mechanization inside the foresting technologies
- [4] Sârnaç A, dr.eng A. Iana. – The forest works mechanization system. The editorial staff for the agricultural technical propaganda
- [5] XXX. – Technical norms for compositions, schedules and foresting technologies. Ministry of Waters, Forests and Medium Protection