

UTAD

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1- Introduction

The natural patrimony of Douro Demarcated Region, characterized by high density slopes vineyards, terraced planted has allowed, since many years, the vine culture in hard topography conditions, where high quality vines are produced and the natural resources are being kept. The high costs production, due to the high labours requirements, makes this "traditional model" not interesting, why the vineyard farmers has being choose to convert the traditional vineyards to allow its mechanisation. This conversion needs, generally, the total system plantation destruction, including the stones walls, which take way the character of natural landscape. So, with the purpose to create conditions to keep the traditional planting systems, it has been studying alternative mechanisation solutions that allow, with only light vineyard installation changes, its feasibility.

2- Methodology

The "Traditional mechanisation vineyards in Douro Demarcated Region" project, developed by UTAD - CEVD, has with main purpose the performance study of a small traction unit, which works with the mains vineyard cultural equipments. The training work done in this project scope, has being done in local farmers, where the partial conversion was done (without stones wall destruction) and the system plantation was adapted to the equipments needs. The trials was done in patch of ground with different soil conditions (ploughed and not ploughed, different stony levels and transversal slope) and plants (different varieties and training system) having the works included the dimensional equipment characterisation, its work rate and its quality work, and the installation vineyards parameters witch allow the best equipments performance.



Traction unit:

- width - 800 mm;
- total length - 2070 mm;
- height - 1970 mm;
- weight - 760 kg;
- diesel engine with 1551 cm³;
- engine power - 22.2 kW @ 3000 rpm

Spading machine:

- n° of spades
- work width - 950 mm;
- length (tractor unit + spading machine) - 2840 mm;
- maximum dept work - 145 mm;
- weight - 160 kg.



Sprayer:

- axial ventilator with 500 mm diameter;
- ten nozzles, in two sectors;
- tank capacity - 200 L;
- piston pump, with 40 L/min debit, at 30 bar.



Clip hedge machine:

- blades length - 900 mm;
- circle diameter done by spinning blades - 600 mm;
- maximum distance between the machine and tractor middle plans - 850 mm;
- maximum distance from the top machine until the ground - 1950 mm.



Pre-pruning machine:

- cutting system with 4 discs;
- height and lateral hydraulic regulation;
- cut height - 450 mm;
- discs number - 4;
- weight - 279 kg.



Wood crush:

- work width - 850 mm;
- rotor with hammers;
- small landing for work height regulation;
- weight - 320 kg..



Tipping transport box:

- steel box;
- reinforced steel chassis;
- dimensions by option;
- weight - 40 kg..



3- Preliminary results

Equipments performance:

Traction unit:

- maximum speed - 6.21 km/h;
- turning area advisable - 3 x 3 m;
- time turn - 15 s;
- maximum slope for moving, in a no stony soil - 50 %;

Spading machine:

- speed range - 1.87 - 2.01 km/h;
- advisable turning area - 3 x 3.5 m;
- average turning time - 30 s

Sprayer:

- advisable turning area - 3 x 3 m;
- average turning time - 15 s;
- paper leaves sensible water cover percentage - 80;
- speeds and debits presented in the table 1:

Table 1- Sprayer debit (L/ha), with different pressures and speeds, and 1.7 m row distance length.

Pressure (bar)	2	3	5	7
L/ha (3 km/h)	319.18	361.84	442.43	505.96
L/ha (4 km/h)	239.38	271.38	331.82	379.47
L/ha (5 km/h)	191.51	217.11	265.46	303.58

Clip hedge machine:

- maximum speed - 2 km/h;
- advisable turning area - 3 x 3.5m;
- average turning time - 40 s;
- length of side plant cut - 600- 700 mm.

4- Conclusions

From the tests done it is possible to get some conclusions, namely these ones:

Traction unit:

The traction unit, with hydraulic transmission, reversible drive seat, and a drive joystick, presents a great manoeuvrability. The use of this unity to work with all equipments, allows a significant decrease of its functional cost.

Spading machine:

The spading machine has a low work rate, so the work speed, to get the same length and height of soil piece cut, can't be bigger than 1.94 - 2.08 km/h. The work done with only a passage, when the row space has to much weeds, isn't enough why it is necessary to do a second passage.

4- Conclusions (cont)

Sprayer:

The sprayer, after some adaptations in the air and pesticide system allows, with more or less 200 L/ha, a uniform leaf distribution. The possibility of interrupt, electrically, the boom sprayer, allow, equally, in the beginning and in the end of the vineyard rows, don't waste pesticide.

Clip hedge machine:

The clip hedge machine has a low speed and leaves the low level vegetation uncut, so it is important to fix the stems; increasing the speed the stems are dragged and not cut.

Vineyard

For a good equipments performance it is necessary the vineyards has the following characteristics:

- minimum row space length - 1.5 m;
- turning top rows - 3 x 3 m;
- maximum lateral slope - 15 %;