HAZELNUT COLLECTION, CALIBRATION AND SHELLING

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Introdution

Hazelnut harvest is one of the more expensive operations why the equipment demand to do so is one of the more important research subject in this culture production. Some particulars orchards Portuguese characteristics, associated with the low productions and high costs, lead us, in the project scope AGRO 162 "Yield increase on hazelnut crop in Portugal" to develop a small equipment with low cost, that could improve the collection work rate.
Besides the collection and considering the differences in the hazelnut size, it was built a calibrator to make several hazelnuts lots with similar size.
As the hazelnut kernel is more expensive than the all fruit it was also built an shell equipment.

Material and methods

The hazelnut harvest AGRO 162

Constitution

The hazelnut harvester AGRO 162 is a equipment basically built by a hopper, a four stroke engine, a ventilator, two flexible tube for conveying the suck material and a wheelbarrow to move the assemblage.

Operating

The engine, positioned at the arms operator level, is manually launched. The material aspiration, owning to the tangentially tubes connection, allows the more weight material, due to the friction with the hopper walls, deposit in hopper bottom being, the light one, transported to the outside.

Harvest

In the hazelnut harvest the work rating is significantly improved when the ground is regular, dry and clean, why is advisable to do some previous works to get this conditions. The ground irregularities, makes the distance between the aspiration tube and fruits, to be different, changing the power suction. The wet soil makes more difficult the hazelnut suction and makes the aspirated soil to settle inside the tubes and hopper, decreasing the suction capacity. This increasing the friction, due to the contact of material aspirated with the wall deposited land and increase, equally, the material that fall down in the hopper, decreasing its cleanliness.

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Calibrator AGRO 162

Constitution

The calibrator is built with three iron sieves mounted in a slope positioned, to allow the hazelnuts rolling; the sieve, with the less distance between separators grill, is positioned at the lower level. Below each sieve it was mounted a cloth structure, in funnel shape, to conduct the hazels to boxes, preventing them to fall down to the ground.

Operating

The hazelnut is deposited in the upper sieve, that leave to pass the fruits smaller than the distance between separators, rolling the remaining ones to the next sieves; the hazelnut, bigger than the major distance between separators, is assembled in the lower top calibrator, settling the bigger lot.

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The shelling equipment AGRO 162

Constitution

The shelling equipment is built, basically, by a metallic roll with two rulers positioned according the generating roll, drive by an electrical engine, witch shrink the hazelnuts against a wood ruler. The distance between the roll and the wood ruler can be adjusted and the rulers welded to the metallic roll, help the hazelnut transport it to the region shrink.

Regulation

The adjustment of this equipment allow get the right distance between the roll and the wood ruler. To get this distance we begin to use the distance corresponding to respective sieve and, by attempts, we short gradually this distance, until we have a good shell percentage fruits without break kernel. This regulation is done turning a crank that allows the wood ruler approach to the roll.

Results

The available results reports only to a trial year why they must be faced with some care.

Hazelnut collector AGRO162

Tests realized in good conditions, with the material spread in the ground (not stringed), allow get times of 3 - 4 min / tree with ± 2 kg / tree production. The distances among the trees were 3 x 5 m which correspond to 33 - 34 h/ha, only to the collection and, for a average production of 1335 kg/ha (667 trees * 2 kg / tree), to empty the hopper, when it has ± 30 kg, are necessary more 2 - 3 h/ha (1335/30*3), because, in average, it takes ± 3 min, to empty the hopper. Total equipment utilisation time, considering the factors mentioned, the time to fill the engine tank, and so on, is estimated in ± 40 h/ha.
In tests realized in hard conditions (material to wet), with strings of ± 1.5 m width, was got collecting times between 10 - 15 min, for 20 m string length, and ± 3.0 min for empty the hopper. The production was not measured because it was done a manual collection before. For 3 x 5 m distance among trees, which correspond to a 2000 m string/ha, for the most difficult situation are necessary (15 min / 20 m) ± 25 h/ha for collecting, which correspond to a total time of ± 33 h/ha; for the best situation are necessary 17 h/ha (10 min/20 m) for collecting which allow to estimate, for the total time, ± 23 h/ha.

Shelling equipment AGRO 162

The lots of the biggest hazelnuts are easier to shell because exist some space between the shell and the kernel.
The average results got with this equipment are the follow:

Lots sizes (mm)	% of intact hazelnut	% of shell hazelnut	% of broken kernel
> 18.0	10	85	5
16.0 - 18.0	5	80	15
14.0 - 16.0	15	70	15

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