

Work Safety and Risk Prevention in Mechanical Harvesting of Olives



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The problem

The Northeast of Portugal is a mountainous region with an important olive production. Slopes difficult mechanical harvesting, being necessary to adopt strategies to face the problem. Special trajectories to move the harvesting equipment inside olive orchards are necessary when slopes increase the risk of accidents. These solutions are necessary for a safe work, but can jeopardize the equipment performance.

Material and methods

Traditional olive orchards - 100 to 150 trees per hectare.

System I (Fig 1) the olives detached by a trunk shaker are collected on two 10m x 10m canvas placed under the canopy projection, and moved by eight labourers.

System II (Fig 3) the olives detached by a trunk shaker are collected on a rolling canvas catching frame mounted on a second tractor.

System III (Fig 5) the olives detached by a trunk shaker are collected by a 9 m diameter inverted umbrella linked to the tractor front-end-loader under the trunk shaker frame.



Figure 1 - System I.

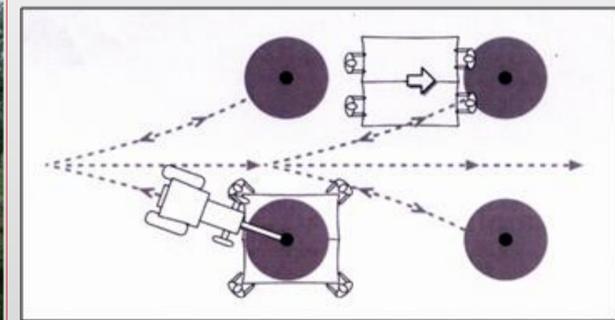


Figure 2 - System I: equipment trajectory.



Figure 3 - System II.

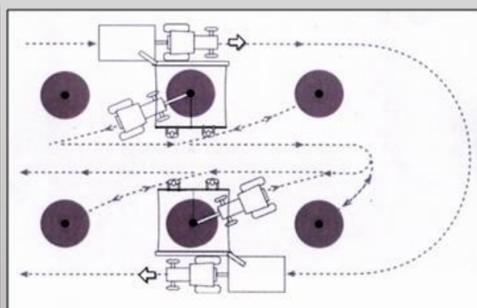


Figure 4 - System II: equipment trajectory in light slopes or flat soils.



Figure 5 - System III.

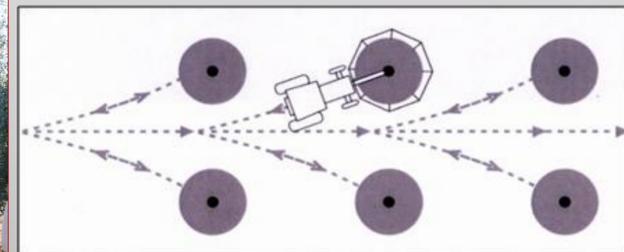


Figure 6 - System III equipment trajectory in light slopes or flat soils.

Alternative trajectories in slopes > 15%

System I work in slopes did not require different trajectories, but more time to move between trees.

System II to ensure a safe work the equipment follows the contour lines, with the rolling canvas always in the higher operation zone (Fig 7). When harvesting finish in one tree line to change to the next, the equipment must go backwards for the beginning of the next line, instead of simply 180° turning.

System III the equipment must move through trajectories perpendicular to contour lines (Fig 8).

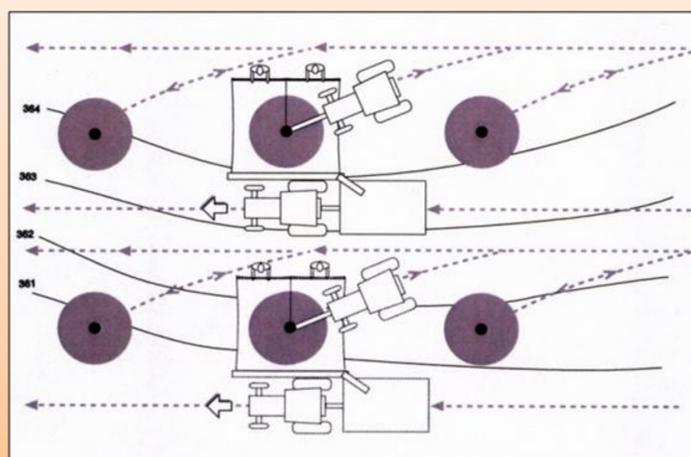


Figure 7 - System II equipment trajectory in slopes.

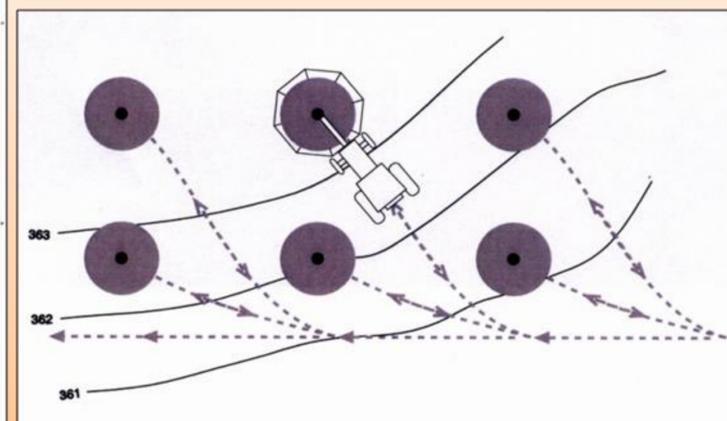


Figure 8 - System III equipment trajectory in slopes.



Figures 9, 10 and 11 – Olive orchards in slopes.



Figure 12 - System III working in slopes.

Results

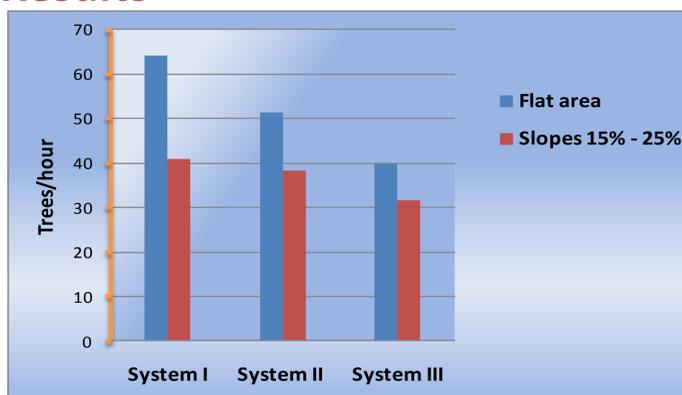


Figure 13– Work rates results.

Discussion

Work rates in slopes are lower than in olive orchards in flat areas. In these field trials, in average, System I work rate have a reduction of 36%; System II work rate have a reduction of 26%; System III work rate have a reduction of 20%.

This fact, increase harvesting costs. Knowing that, olive growers can adopt the alternative trajectories to guaranty a safe work, if the olive oil quality pays the more expensive harvesting in these situations.