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Evolution of factors affecting mechanical olive harvesting

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THE PROBLEM

- Mechanical olive harvesting systems adopting trunk shakers detaches less than 100% of the production.
- It is important to improve mechanical **harvesting efficiency** (considered as the percentage of fruit removed from the total crop on the tree) to get better farmers net return.
- Fruit removal force (**FRF**), fruit weight (**P**) and the **ratio** between them are important for harvest efficiency.
- **These factors affect the efficiency of mechanical harvest and can be also used as an indicator of when to begin and finish harvest season .**

MATERIAL AND METHODS

- Field trials took place in Northeast of Portugal in 2013/14
- Irrigated olive orchard with'Cobrançosa Transmontana' cultivar.
- The mechanical harvesting system (Fig. 2):
  - ✓ **Trunk shaker** to detach olives collected by **inverted umbrella.**
- To evaluate work rate, elementary time in seconds were taken.
- To evaluate fruit removal force (**FRF**) and fruit weight (**P**) measurements were made in randomized plots.
- Measurements of force required to remove olives from the shoots were made with a dynamometer Chatillon (Figs 3, 4).

Figure 1. Olive orchard were field trials took place

Figure 2. Mechanical harvesting equipment

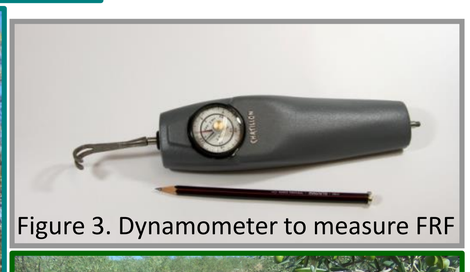

Figure 3. Dynamometer to measure FRF

Figure 4. Dynamometer measuring FRF

RESULTS AND DISCUSSION

- **Figures 5 to 10** show – **evolution of FRF/P in the ripening period**.
- Harvesting yields equal to or higher than 85% are considered the **breakeven point** for mechanical harvesting of olives with trunk shakers.
- The establishment of a **FRF/P ratio** value related to the referred **breakeven point,** allow using FRF/P as a useful indicator of the most **appropriate period of time for harvesting.**
- **Figure 11** – elementary time to compute equipment work rate.
- **In Table 1** – work rate values.

Time to move equipment between trees assumes a great importance – good conditions to move equipment have better chances to improve work rate.

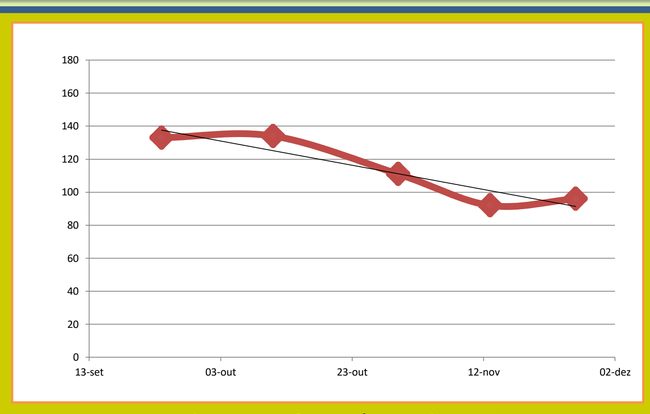

Figure 5. Evolution of FRF/P – plot 1 in 2013

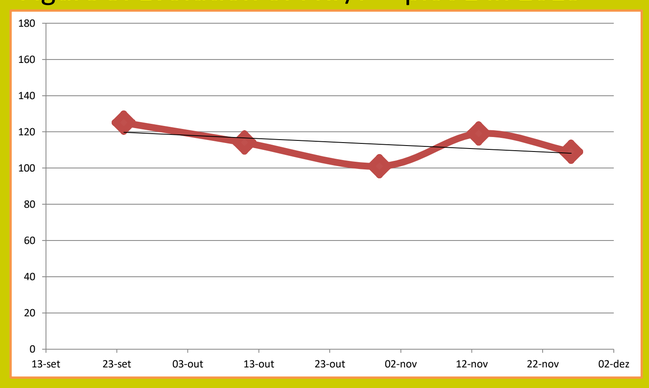

Figure 6. Evolution of FRF/P – plot 2 in 2013

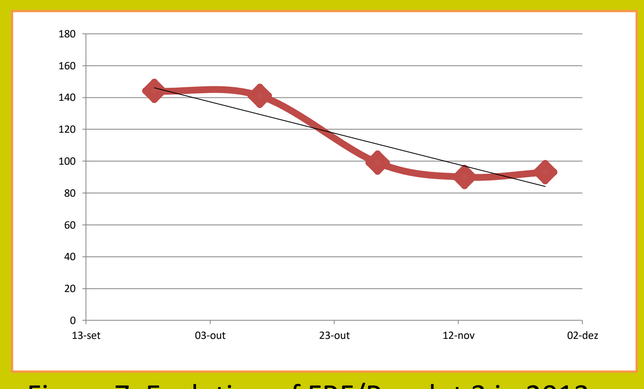

Figure 7. Evolution of FRF/P – plot 3 in 2013

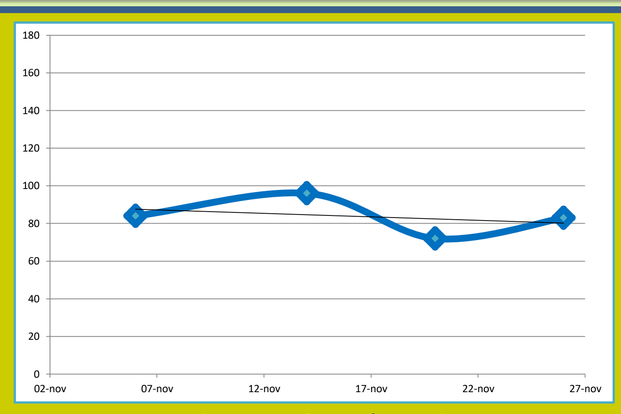

Figure 8. Evolution of FRF/P – plot 1 in 2014

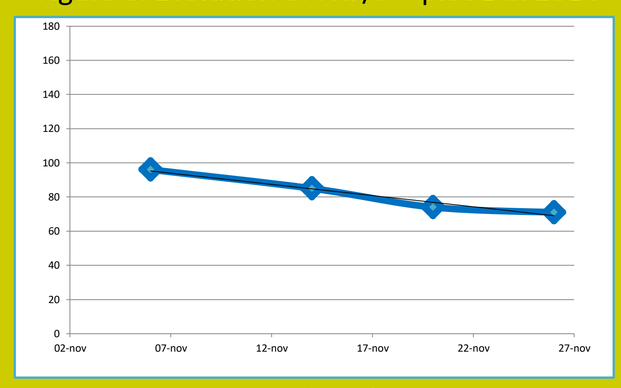

Figure 9. Evolution of FRF/P – plot 2 in 2014

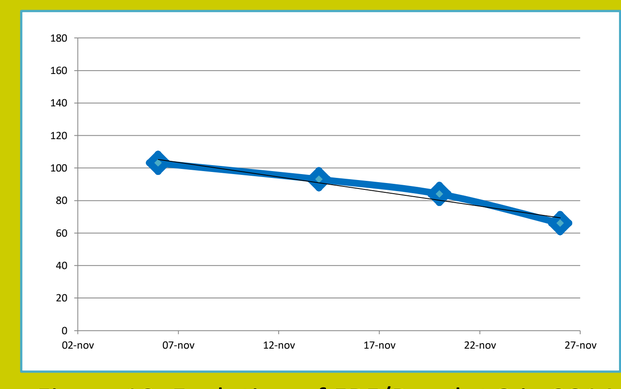

Figure 10. Evolution of FRF/P – plot 3 in 2014

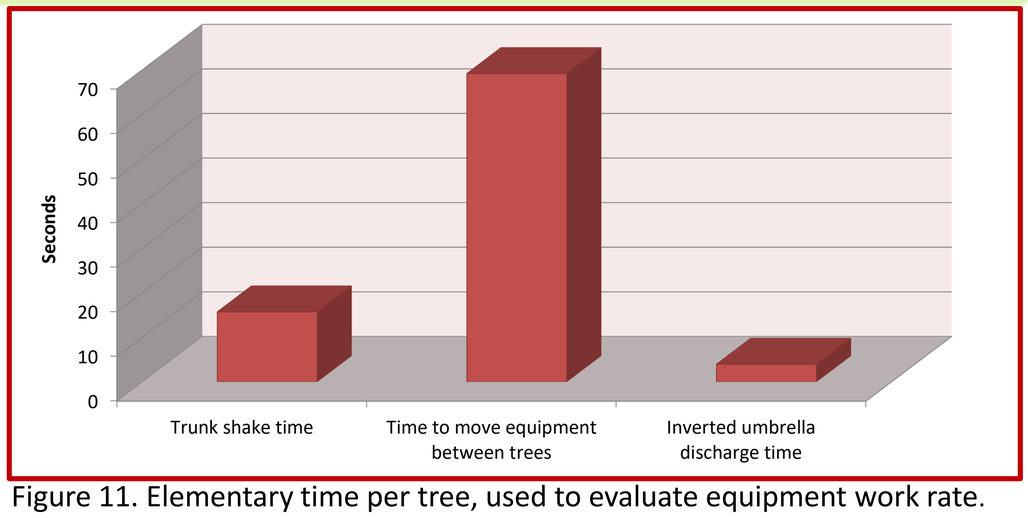

Figure 11. Elementary time per tree, used to evaluate equipment work rate.

Table 1. Work rate value (trees/hour).

Average	Minimum	Maximum	S D
52.0	40.0	57.0	5.29