

Field data (Each questionnaire refers to one crop species cultivated per field)

Municipality : Cisterna di Latina

Latitude : 41.597038

Longitude : 12.845471



Field Size (ha) 0.46

- Crop Species
- |  |                                    |                                     |                                  |
|--|------------------------------------|-------------------------------------|----------------------------------|
| <input type="checkbox"/> olives                      | <input type="checkbox"/> vineyards | <input type="checkbox"/> apples     | <input type="checkbox"/> pears   |
| <input type="checkbox"/> peaches                     | <input type="checkbox"/> apricot   | <input type="checkbox"/> nectarine  | <input type="checkbox"/> plum    |
| <input type="checkbox"/> cherries                    | <input type="checkbox"/> oranges   | <input type="checkbox"/> tangerines | <input type="checkbox"/> lemons  |
| <input type="checkbox"/> grapefruit                  | <input type="checkbox"/> hazelnuts | <input type="checkbox"/> chestnuts  | <input type="checkbox"/> almonds |
| <input checked="" type="checkbox"/> kiwi (ακτινίδια) |                                    |                                     |                                  |

Variety of crop \_\_\_\_\_

Age of crop \_\_\_\_\_

Density of crop (trees/ha) \_\_\_\_\_

Width between cultivated rows (m) 5.0

Distance between trees (m) 4.0

Crop form

Crop forms for vineyard



Vase



Espalier



Marquee

Crop forms for Olive



Ancient olives



Vase (1 stem)



Vase (2-3 stems from soil)



Bush (intensive 250-600 trees/ha)



Superintensive (>1500 trees/ha)

Crop forms for fruit trees



Natural



Vase



Bush/Globe (very small trees)



Spindle/Pyramid



Palm/Fan



Epsilon transversal

Slope (%) \_\_\_\_\_

Soil Cover



Bare.No grass cover.  
Tillage several times per year



Seasonal occurrence.  
Herbicides+mowing  
<50% soil cover



>50% grass cover.  
Mowed several times per year



100% Grass cover.  
Mowed several times per year

### Crop Yield

Average Crop yield (t/ha) \_\_\_\_\_

Crop yield before measurement (t/ha) \_\_\_\_\_

Amount of product obtained for the year that the pruning measurement is performed in tonnes per hectare

Irrigation  rain fed  partial irrigation  fully irrigated

Intensification degree  organic  low  intermediate  
Specify the amount of fertilizer and pesticides  high

## Pruning Operations Performed

Type of pruning

- |  |                                   |
|--|-----------------------------------|
| <input checked="" type="checkbox"/> Maintenance  | <input type="checkbox"/> Grafting |
| <input type="checkbox"/> Structuring             | <input type="checkbox"/> Topping  |
| <input type="checkbox"/> Removal of old branches | <input type="checkbox"/> Blooming |

Pruning Method

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Only manually | <input type="checkbox"/> Mechanised pre-pruning + manual |
| <input type="checkbox"/> Fully mechanised         |  |

### Pruning Operations

Specify the pruning operations that are carried out. Check as many as apply.



- Manually shears



- Assisted shears



- Chainsaw/armchainsaw



- pre-pruner:hedge trimmer



- pre-pruner:discs



- pre-pruning topping

Season of pruning

- |                                    |                                   |                                   |                                   |
|------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| <input type="checkbox"/> January   | <input type="checkbox"/> February | <input type="checkbox"/> March    | <input type="checkbox"/> April    |
| <input type="checkbox"/> May       | <input type="checkbox"/> June     | <input type="checkbox"/> July     | <input type="checkbox"/> August   |
| <input type="checkbox"/> September | <input type="checkbox"/> October  | <input type="checkbox"/> November | <input type="checkbox"/> December |

Frequency of pruning

- |                                 |                                   |                                   |   |
|---------------------------------|-----------------------------------|-----------------------------------|---|
| <input type="checkbox"/> annual | <input type="checkbox"/> biannual | <input type="checkbox"/> biennial | <input type="checkbox"/> Once per years |
|---------------------------------|-----------------------------------|-----------------------------------|---|

## Mechanized Collection

Preparation of the field prior to harvesting



No preparation - prunings were left on the soil as they fall from tree



Centre-operator position prunings on the center of the lane between tree rows



Centre aligned-operator position prunings in a specific position in center (e.g. aligned with the direction of the row)



Previous windrowing-a tractor with windrower is used prior pruning harvester

Integrated windrower to the pruning machine

## Harvesting methods

Check according to the figures below the harvesting method that is used for the pruning biomass

|   |   |                                     |
|---|---|-------------------------------------|
|     | Manual cross-cutting of firewood+gathering at field side                              | <input type="checkbox"/>            |
|    | Forestry chipper towed by tractor + manual feeding                                    | <input type="checkbox"/>            |
|    | Hauling the branches + shredding/chipping at field side                               | <input type="checkbox"/>            |
|    | Hauling the branches + baling at field side   | <input type="checkbox"/>            |
|    | Harvest with mulcher/chipper in front   | <input type="checkbox"/>            |
|    | Harvest with mulcher/chipper at rear  | <input type="checkbox"/>            |
|    | Harvest with rear mulcher/chipper and bin   | <input type="checkbox"/>            |
|    | Harvest with rear mulcher/chipper and big-bags  | <input type="checkbox"/>            |
|  | Automotive shredder/chipper with rear trailer   | <input type="checkbox"/>            |
|  | Harvest with standard hay baler   | <input type="checkbox"/>            |
|  | Harvest with rear baler prepared for wood or tree branches                            | <input checked="" type="checkbox"/> |
|  | Pre-pruning integrated with collection and mulching/chipping                          | <input type="checkbox"/>            |
|  | Pre-pruning integrated with collection and mulching/chipping in an automotive machine | <input type="checkbox"/>            |

**Type of pruning treatment and model of machinery**

Specify the method that prunings are treated based on the outcome product and manufacturer-model of each machinery (windrower,mulcher,chipper,baler) that is used if applicable



Windrower-Machines that align biomass in a row

Windrower (manufacturer-model) \_\_\_\_\_



Mulcher-big pieces. Machines that break the branches in big pieces. Normally they are an evolution from the typical mulchers/cruchers utilised to leave the branches on the soil in pieces.

Mulcher (manufacturer-model) \_\_\_\_\_



Shredder - Produce finer material (hammers or hammers with a knife.Do not produce a clear cut)

Shredder (manufacturer-model) \_\_\_\_\_



Chipper - Clean cut. Resembles the typical form of forest woodchips

Chipper (manufacturer-model) \_\_\_\_\_



Round bale

Baler (manufacturer-model) Caeb MP400



Squared bale

Baler (manufacturer-model) \_\_\_\_\_

### Processes Specifications

Specify the specifications of the processes (manpower, gross working time, productivity, fuel consumption)

Check as many as apply

| Processes                          | Manpower<br>(Nr of persons)         | Gross working<br>time<br>(hr/ha) | Productivity<br>(t/ha or t/hr) | Fuel<br>consumption<br>(l/hr) |
|------------------------------------|-------------------------------------|----------------------------------|--------------------------------|-------------------------------|
| Manual Alignment                   | <input type="checkbox"/>            | _____                            | _____                          | _____                         |
| Windrowing                         | <input type="checkbox"/>            | _____                            | _____                          | _____                         |
| Integrated<br>harvesting/treatment | <input checked="" type="checkbox"/> | _____                            | 6.08                           | 1.8 t/hr                      |
| Hauling                            | <input type="checkbox"/>            | _____                            | _____                          | _____                         |
| Treatment at field side            | <input type="checkbox"/>            | _____                            | _____                          | _____                         |
| Disposal/dumping of<br>biomass     | <input type="checkbox"/>            | _____                            | _____                          | _____                         |

### End product properties

Specify the properties (moisture, bulk density, particle size, ash) of the prunings after treatment and harvesting, if known

|                                   |       |                           |       |
|-----------------------------------|-------|---------------------------|-------|
| Moisture (% a.r.)                 | _____ | Particle size (cm)        | _____ |
| Bulk density (kg/m <sup>3</sup> ) | _____ | Ash content (% dry basis) | _____ |

Losses of biomass after harvesting

(%) \_\_\_\_\_ or (tonnes/ha) 0.80

Problems encountered due to the field

- |                                      |   |
|--------------------------------------|---|
| <input type="checkbox"/> Soil uneven | <input type="checkbox"/> Slope          |
| <input type="checkbox"/> Stones      | <input type="checkbox"/> Too much grass |

Problems encountered by the machines

- |   |   |
|---|---|
| <input type="checkbox"/> Not suitable for the pruning                                 | <input type="checkbox"/> Manouvering  |
| <input type="checkbox"/> Unsuitable feeding system (biomass difficult to be conveyed) | <input type="checkbox"/> Too much soil particles with the biomass to be treated |
| <input type="checkbox"/> Problems in discharge  |   |

Performance of the machinery

- The machinery was performing better than expected
- The machinery was performing normally-typical expected
- The machinery was underperforming

### Value Chains

Indicate if your experience is based on an isolated test or if it based on an existing value chain:

- My experience is just an experimental trial-machinery test
- My experience is part of an existing value chain

## Contact Data

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Raffaele Spinelli ,Nataschia Magagnotti, Carla Nati, L. Pari, J.L. Vanneste, Recovering kiwifruit pruning residues for biomass production. Transactions of the ASABE Volume 55,Issue 1, December 2011, Pages 1-8

