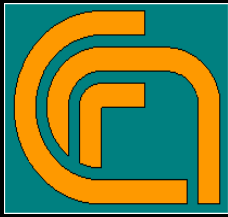


Harvesting poplar medium rotation coppice with light equipment

Spinelli R., Nati C., Magagnotti N., Picchi G.
CNR-IVALSA, Italy



International Poplar Commission 2008, Beijing



National Research Council



Timber and Trees Institute

www.cnr.it

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20 years experience in research on forest mechanization.

Main themes: forest and agricultural biomass production, SRC harvesting.



SHORT ROTATION COPPICE (SRC) IN ITALY

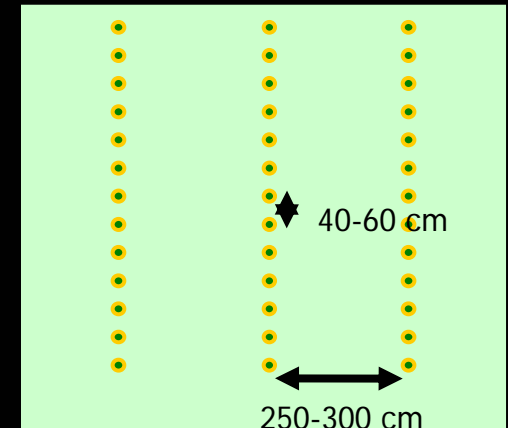
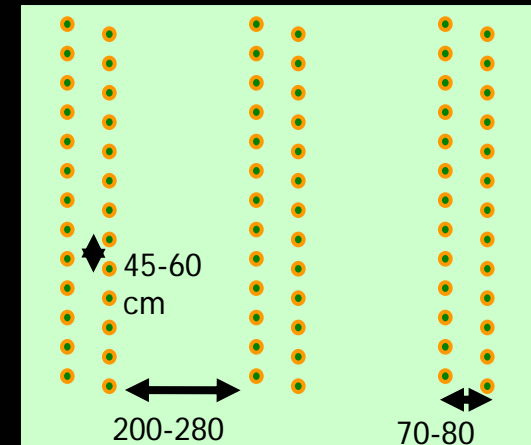
About 5,000 hectares of SRC plantations in less than 10 years

First plantations Swedish model, then specific schemes for poplars

Very short (1 year)

to

Short rotation (2 years)



MEDIUM ROTATION COPPICE (MRC)

Managed as a coppice

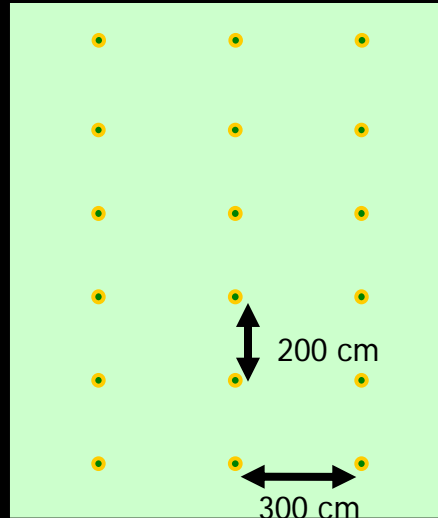
1,100-1,500 plants/ha

Up to 20 cm DBH

5 years long rotation

At least 3 rotations

Providing different assortments (fuelchips, pulpwood, etc.)



Promising performances, but it poses new challenges for harvesting...

SRC HARVESTING

SRC is harvested by corn foragers with modified header:

- reliable, cheap and efficient system;
- machines can move independently on public roads easily covering scattered plantations.

Constrain:

- cannot harvest stems exceeding 10-12 cm DBH



MRC HARVESTING

Harvest has to be done with forest machinery, but...

- due to small stem size productivity may be achieved only with multiple stem handling and correct size machinery;

- ease to translate to different plantations is crucial.

With the aim to find an efficient and viable MRC harvest system CNR-IVALSA tested a light prime mover equipped with a multiple stem header.



THE TESTED HARVESTER

Prime mover: Bobcat T300 (70 kW), with high pressure hydraulic system (230 bar)

Felling head: Davco QC 1400 with circular saw for ground level cutting (max 35 cm)



THE TEST

Plantation descriptors:

Age - 5 years

Trees - *P. alba* clone "Marte"

Density - 1,100 plants/hectare

Average DBH - 9.8 cm

Yield - 87.9 fresh t/ha



Harvester working scheme:

- 1 - moving forward it harvests two trees per cycle;
- 2 - turning by the side it lays them in windrows as bunches of whole trees (one every six tree rows);

PERFORMANCE

2,143 trees harvested in 767 working cycles:

- 10.1 t/hour gross productivity
- Resulting cost of 5.0 €/t

COMPARISON

Timberjack 762 C



Dedicated forestry harvester on a better stand (DBH 10.7 cm and 107.4 fresh t/ha):

- Working cost of 4.9 €/t

CHIPPING

The whole trees were comminuted with a self propelled chipper:

- independent operation;
- can follow harvest few months in order reduce biomass humidity through natural drying;



According to site and work condition, chipping and transportation of biomass may add about 15 €/t to fresh biomass cost, being this a fixed cost, independent by the harvesting systems used.

RESULTS

- Harvesting MRC plantations is possible both with heavy forestry machinery and with light equipment within a cost of 5 € per fresh ton;
- the low transportation cost of the light harvester becomes a great advantage when working on small, scattered plantations;
- Mini loader may be used all year round in no forestry works or easily rented for few months during the harvesting period (wintertime);
- Multiple stem handling is crucial for efficient operation with small trees;
- The overall cost of biomass including chipping and transportation is about 20 €/t, but there is still much room for improvement.



THANK YOU

(and many, many thanks to Gianni Facciotto!!)



For further information:

Raffaele Spinelli

spinelli@ivalsa.cnr.it

www.biomassaforestale.org