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Improving safety and productivity in firewood harvesting from coppices

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COPPICE MANAGEMENT:

- Coppice is usually harvested with short rotation clear cuts
- Management after 50's - "Aged coppices" - Higher wood volume per stem
- Since the 60's, the minimum diameter of harvested firewood has increased as a consequence of increased manpower costs

ASSORTMENTS FROM COPPICE:

- Firewood – traditional - wide and active market
- Poles, fencing, sawlogs, (Chestnut Black locust)
- Increasing production of Woodchips (logging residue)

FIREWOOD MARKET:

Firewood is usually sold «loaded onto truck», and at present the selling price ranges from 60 to 70 € t^{-1}

WORKING SYSTEM AND SAFETY:

Despite the introduction of safe mechanised methods in Italy, in forest utilization and especially in coppice harvesting the risk of injuries for the operators is still high.

In Italy coppice are mainly harvested to produce firewood and risks are mainly due to the use of chainsaws in felling and processing and also to the operations of wood extraction, loading and transport from forest to the further processing industries.

The traditional working method is based on the cut to length systems and the harvesting cycle begins with motor-manual felling and ends when firewood is loaded onto truck. The wood extraction may be carried out, depending on slope and accessibility by animals, chute, tractor and trailer and tractor with bins.

After extraction firewood is manually loaded onto trucks by two or three operators standing on the truck while a loader lifts the firewood to be stacked. This work phase is one of the most dangerous of the whole process and the risk to slip or to fall is very high.

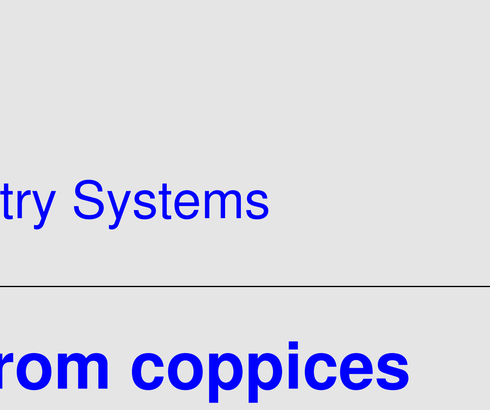
This study analyses the use of a firewood baler at the landing and the advantages, in terms of safety, of using a loader to load bales onto trucks.

The firewood baler is mounted on three-point hitch of a tractor and the compaction is carried out by two couples of mobile arm pushed down by hydraulic cylinders. After compaction the bales are fastened with twine or iron wire. This method is also compared to the traditional use of tractor with bins in terms of productivity.

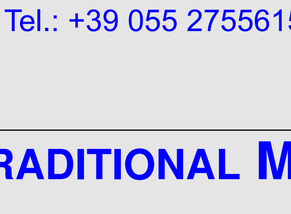
HARVESTING: TRADITIONAL METHODS - CTL:

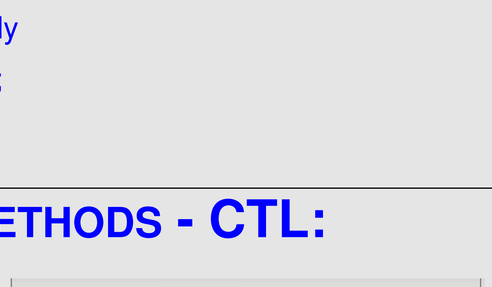
Cut to Lenght System (firewood extraction)

- Animals
- Chute
- Tractor and trailer
- Load capacity 7-10 stere: 4 - 6t (1 stere ~ 0,6 t)



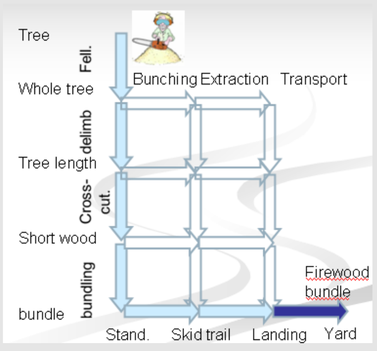
- Tractor with bins
- Bins load: 2 – 3 t





RECENT TECHNOLOGY IN COPPICE HARVESTING:

- Cut to Lenght System
- Motor-manual felling and processing
- Firewood baled at felling site or landing (depending on ground slope)
- Bale diameter 1-1.4 m (~ 1 t)



- Extraction
- Bales extraction by tractor from felling site with front and rear fork tools

- Truck bales loading by loader (simple, fast safier)

WHOLE CYCLE PRODUCTIVITY ANALYSIS

Method	Extraction by tractor with bins Manual truck loading	Extraction by tractor with bins Bales production at the landing Truck loading by tractor with front fork tool and hydraulic elevator	Bales production on the felling site Bales extraction by tractor with front and rear fork tools Truck loading by loader
Gross productivity (t/h/man)	1,06	0,97	1,01

- Higher whole cycle productivity for the "traditional" and "manual" system
- Important improvements related to safety with the mechanized truck loading

COST Action FP 1301 - Eurocoppice

Coppice Forests in Europe: a traditional natural resource with great potential

Limoges, France, 19 – 21 June, 2017