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Field Performance of Motor-Manual Felling in Willow Short Rotation Crops

FORMEC Romania 2017

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INTRODUCTION

Willow short rotation crops (WSRC) in Romania

= are a current option for timely obtaining biomass for energetic use;

= cultivation requires several operations: soil tillage, planting, weed control and fertilization, cutback, and harvesting are among those specific.

= is implementing very short rotations, which enables the use of available low-cost equipment in the harvesting operations.

INTRODUCTION

This study reports results on the field performance in motor-manual felling of WSRC shoots using brush cutters.

In particular, the aim of this study was to estimate the performance of such operations by:

(i) *quantifying the time consumption involved by motor-manual felling including its variation in relation to operational factors,* and by

(ii) *estimating field performance in terms of net and gross production rates.*

MATERIALS AND METHODS

Fig. 1. Study area; Legend: A - the general location, and B - WSRC layout showing the boundary of the field test

MATERIALS AND METHODS

Fig. 2. A snapshot of the studied felling procedure

MATERIALS AND METHODS

Two categories of data were collected from the field:

= data describing the growing stock to be harvested and

= time consumption data.

RESULTS AND DISCUSSION

Predictive Model of Time Consumption	Model Statistics				
	N	R^2	Sig. F	Predictor	p-value
RT (s) = 3.752 × RL (m) + 48.250	62	0.95	<0.001	RL	<0.001
TT (s) = 0.919 × TL (m) + 12.128	53	0.39	<0.001	TL	<0.001

Note:
N- No. of observations,
R^2- adjusted coefficient of determination,
Sig. F- results of global significance test,
p- results of predictor significance tests,
RT- delay-free on-row time,
RL- row length,
TT- delay-free turning time,
TL- turning length

CONCLUSIONS

Motor-manual felling of SRCs yielded a lower performance compared to that specific to dedicated harvesting equipment. However, it fits the needs of small-scale farmers by its low investments in equipment, full utilization of the field, and relatively easy to use procedures. Nevertheless, the final harvesting costs may be affected to a great extent by the variability of labor costs in various regions while the technique could be less safe compared to the use of mechanized equipment.

CONCLUSIONS

There is still room for performance improvement of motor-manual felling by excluding those delays produced by an improper organizational layout. Such issues should be addressed by programing following a deeper understanding of the overall system’s performance.

CONCLUSIONS

There are some technical limitations of the studied felling procedures that delineate their operational range. Brush cutters could be sensitive to the variation of size characteristics of the standing stock, specifically to those related to the shoots' diameters. Also, hard winds may impede the felling operations.

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THANK YOU FOR YOUR ATTENTION!

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