# Production of wood from *Populus nigra* L. clones



## over two rotations

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#### Introduction

*Populus nigra* is an autochthonous European woody species that is being trialed as an alternative crop for biomass production in short-rotation coppiced stands. It is irreplaceable in regions where the planting of allochthonous species is usually not allowed (e.g. national parks).

The aim of the trial was to test the performance of black poplar clones as a possible replacement for commercial hybrid poplars, and to measure their potential yield in short rotation coppice systems.

#### Materials

21 clones of *P.nigra* from own breeding programme (Benetka et al. 2012)
Clone 'MAX-4', an interspecific hybrid of *P. nigra × P. maximowiczii*, used as a control

#### Methods

- Trial established in Průhonice (320 m a.s.l., 545 mm rainfall) in 2009
- Plant spacing 3.0 x 0.55 m (6,061 plants.ha<sup>-1</sup>)
- Two harvests at three-year interval

• Evaluated characteristics: plant mortality, leave rust incidence, number of shoots, thickness of shoots, the dry matter weight of individual plants (DMIP) and the dry matter yield per hectare

• Statistical analysis (Statistica 8.0) – ANOVA, Duncan test



Fig. 1 The trial plot in summer before the second harvest



Fig. 2 The trial plot during the second harvest

#### Results

• High genotypic variation in biomass production (yield) and other evaluated growth characteristics was observed, mortality was negligible

• Rust incidence in some black poplar clones was as low as in 'MAX-4'

• The number of shoots per plant after the harvest increased and was higher in the black poplar clones compared to 'MAX-4' (Tab.2)

• Leading shoot diameter of the best black poplar clones were not statistically different from 'MAX-4' before the first rotation (Tab.1) but significantly lower before the second one (Tab. 2)

• 'MAX-4' gave the highest biomass yields in both rotations (Tab. 1, Tab. 2), but biomass yields of the best black poplar clones were satisfactory

• The differences observed between 'MAX-4' and the best black poplar clone increased in second harvest

	dry matter yield [t.ha <sup>-1</sup> .yr <sup>-1</sup> ]	DMIP [kg]	thickness of shoot [mm]
cione	mean ± SE	mean ± SE	mean ± SE
MAX-4	11.2 ± 0.5 a	5.6±0.3 a	68.18 ± 1.3 a
00/274	8.0±0.3 b	3.9 ± 0.2 b	63.40 ± 1.9 abc
02/455	7.8±0.2 b	3.8 ± 0.1 b	68.05 ± 2.9 a
02/21	7.7±0.7 b	3.8 ± 0.4 b	61.50 ± 3.9 abcde
00/237	7.7 ± 0.4 bc	3.8 ± 0.2 bc	57.17 ± 2.0 bcdefgh
02/477	76 + 10 bc	27+05 bc	64 80 + 3 0 ab

Tab. 1 Yield and growth parameters of six best clones in first rotation

#### Tab. 2 Yield and growth parameters of six best clones in second rotation

	dry matter yield	DMIP	thickness of shoots	number of choots
	[L.IIdyi -]	[Kg]	[[[]]]	number of shoots
clone	mean ± SE	mean ± SE	mean ± SE	mean ± SE
MAX-4	17.3±0.9 a	8.6±0.4 a	29.7 ± 1.3 a	5.9 ± 0.2 n
02/456	11.7±0.8 b	5.8±0.4 b	20.3 ± 0.8 bcdef	12.3 ± 0.9 abcd
02/455	11.5 ± 0.5 bc	5.7 ± 0.2 bc	20.2 ± 0.8 bcdef	12.0 ± 1.1 abcde
02/477	11.0 ± 1.3 bcd	5.4 ± 0.6 bcd	19.0 ± 0.6 bcdefgh	14.1 ± 1.0 a
02/371	10.6 ± 0.7 bcde	5.2 ± 0.3 bcde	20.0 ± 0.8 bcdefg	12.0 ± 0.9 abcdef
02/378	9.9 ± 0.8 bcdef	4.9 ± 0.4 bcdef	18.6 ± 0.7 cdefgh	10.8 ± 0.6 bcdefghi

#### Conclusion

• Great variation in the recorded attributes of the tested black poplar clones was observed, so some of the better performing ones might still be selected, even if the control clone here did have the highest biomass production

• The successful clones are recommended for use in those areas where the genetic purity of native populations of black poplar is threatened by the spread of commercially grown hybrid poplars

• The trial will continue to be evaluated in future rotations

#### References

Benetka V., Novotná K. & Štochlová P. 2012. Wild populations as a source of germplasm for black poplar (*Populus nigra* L.) breeding programmes. Tree Genetics and Genomes 8(5): 1073–1084.

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