



Pigs and poplars

A smart combination for environmental protection, animal welfare and meat quality

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Why keep pigs together with poplars ?

Free-range systems aim to support animal welfare and are common in organic pork production. However, they do represent an environmental risk due to the depositing of manure. Maximum stocking rates are prescribed assuming that nutrients released with manure will be spread uniformly in the field and may be absorbed by cover crops roots. In practice, there are several problems with these assumptions: pigs often decide to use one specific part of the paddock to defecate; sandy-soil fixes a small amount of nutrients; and herbaceous cover crops are more active during spring summer and less so in other seasons (Tagliapietra et al. 2007).

Trees, especially fast growing ones, such as poplar (but also willow, black locust) absorb high amount of nutrients and can reduce the risk of leaching, as well as spot water contamination through better drainage (AA.VV. 2011). Moreover, developed trees can provide a good welfare environment for pigs: cool shade in hot weather conditions and shelter from cold winter wind.



Newly poplars high density plantation (1st year)
Ref: Bondesan, 2014



Growing organic pigs in a newly planted (2nd year) high density poplars. Ref: Bondesan, 2015

How to establish poplars within open range systems

To assess different options, experimental trials were developed within an organic free range pig unit in an agroforestry system located in the northeast of Italy-Padania plane. (Veneto Agricoltura Azienda Sasse-Rami, Ceregnano – Rovigo , 45.050760° N; 11.880257° E)

Poplar is a fast growing species well-suited for free range pig production in plain alluvial deep-soil where groundwater is normally present (1.5-2.0 m underneath). Spacing, intra-inter row distance and the final number of trees per hectare depends on soil type, field range design, pigs categories, stoking expected during the production, and the wood destination at harvesting. In sandy soil types, tree density should be higher than those with loamy-clay textures, which have a better root-net capacity of manure nutrients absorption.

Under normal conditions, the harvesting cycle of poplar for packaging wood (main logs) or firewood (woodchip) could be every 10-12 years with a medium density plantation (200-300 trees/ha), but as short as 5-6 years (woodchip) with high density "short rotation" (1500-2000 trees/ha). Spacing of low-density plantations may vary from 3.0-4.0 m between trees and 16-25 m between rows. For high-density planting, recommended for growing-fattening heavy pigs, the common spacing is between 1.5-2 m x 3.0-3.5 m (with sufficient spaces left without trees for locating huts or feeding and drinking points).

Planting should be done in late autumn or early spring, using one year old rods (3-4 m long), planted at a depth of 1.3-1.5 m. Newly planted poplars must be protected from pig damage (mainly bark biting and scratching) by proper shelters. The area cannot be used by pigs until the second year, by which time the trees will be more resilient. There are very few types of shelter that can be used to protect newly planted trees from damage by pigs. According to the findings, a metal cage of 60-70 cm high around the trees will provide the best protection. Nevertheless, a low percentage (5-12 %) of trees are still likely to be seriously damaged (Bondesan, 2016). Metal cages should be removed before the tree growth incorporates it within the bark; if that happens more labour will be required to pull it away before harvesting.



Advantages

Incorporating high-density poplar fields within the production system of organic free range fattened heavy pigs (slaughtering live weight about 180-220 kg), brings several benefits.

- High-density trees ensure an extensive root covering and good absorption of manure nutrients in the "defecation area" chosen by pigs.
- Poplar growth receives a beneficial effect from the pigs' manure, and woodchip production may increase.
- Welfare of restricted feed intake growing pigs improves, especially during the hot summer weather, since good shadow cover provides temperature control at ground level.
- A more friendly "animal and environmental" system, organic plus agroforestry, may represent an extra quality attribute that influences consumers choice towards traditional pork products.



Feed restricted growing pigs could increase bark biting and tree damage Ref: Bondesan, 2014

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Using fast growing trees in free-range fields for organic pigs provide several benefits. Nevertheless, the combination of growing pigs and trees, with high-density spacing, needs a detailed knowledge of animal behaviour and management. Pigs, being very curious and interactive animals, like to explore the environment and will exhibit both social and natural behaviour. In organic systems, with pigs not being nose-ringed, rooting is a main activity. In the wettest areas, due to rolling in the mud, tree-roots damage and soil structure deterioration may reach severe levels. Soil conditions may deteriorate in wet periods and annual tillage could be necessary.

During the fattening period (9-11 months), in order to prevent excessive fat deposition in the carcass and limit production costs (due to a lower feed conversion rate), pigs are normally restricted for a few months. During this period, pigs tend to increase the time spent for searching for food, rooting, biting bark and, if present, increase grass ingestion. In a newly established plantation, pigs may cause serious damage to trees if they are not protected with proper shelters. If a tree is left without protection, severe bark damage may occur, leading to the death of the tree. Monitoring the trees' condition, replacing the damaged shelters, reducing stocking rates, and shortening the rotation time can help to reduce the percentage of damaged trees.



	A	B	C	D	E
Type of shelter	FruitWrap	Square shelter	Spiral ribbon	Metal cage shelter	Control
	One side open tube with spiral wrap effect (h=75 cm)	A four side open box with flaps of closure system (h=60 cm)	Holed plastic ribbon, with spiral curving (h= 60 cm)	Thin metal wire net, with hooks to making a cage around the tree (h=66 cm)	No protection
Proportion of trees	%	%	%	%	%
Shelters damaged (1st trial)	4.0	14.0	37.0	2.0	
Shelters damaged (2nd trial)	13.0	21.0	64.0	4.0	
Trees damaged after 1st trial	1.0	3.0	6.0	0.0	9.0
Dead trees after 1st trial	0.0	0.0	2.0	0.0	4.0
Trees damaged after 2nd trial	3.0	5.0	9.0	0.0	11.0
Dead trees after 2nd trial	0.0	1.0	3.0	0.0	7.0

Four different types of shelter used to protect poplars (above): metal cage "D" is the most effective shelter. (Based on assessment of 200 trees for each type of protection.) -Ref: Bondesan, 2014

Further information

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