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Leibniz Center for Agricultural Landscape Research (ZALF)

Alley cropping with poplars:

When is this agroforestry system worthwhile?

Page | 1

A recent study, published in the journal *Agroforestry Systems*, sheds light on the economic potential of agroforestry systems that integrate rows of poplars on arable land and compares them with conventional arable farming in Brandenburg. In their study, scientists from the Leibniz Centre for Agricultural Landscape Research (ZALF) show the conditions under which these so-called "alley cropping" systems can be economically viable and how targeted political support measures play a decisive role in their implementation.

The concept of alley cropping combines poplar strips with conventional arable farming and thus offers not only economic but also ecological benefits. Particularly in Brandenburg, where the soil is often dry and low-yielding, this form of cultivation can help to stabilize soil fertility and promote biodiversity. The study compares the profitability of these agroforestry systems with conventional arable farming through detailed modeling of various influencing factors. These include:

1. **Poplar harvest cycles:** Both short (every 4 years) and medium (every 8 years) rotations were investigated to find out which harvest intervals have the greatest impact on liquidity.
2. **Market prices for wood chips:** The researchers analyzed how different price levels for poplar wood affect the profitability of the systems. Short rotations in particular prove to be economically stable at high wood prices, while medium rotations are difficult to compete at lower wood prices without financial support.
3. **Width of the field strips (alley):** Depending on the width of the cropland between the poplar strips (24, 48 or 96 meters), the proportion of timber and field crop yield varies. Narrower spacing could improve wind protection

and thus stabilize yields, while wider alley spacing requires less tree area on arable land, which could be attractive for farmers who want to minimize the proportion of trees.

"Our analyses show that short rotations of alley cropping with poplars in particular can be economically attractive even without subsidies if the prices for wood chips are high," explains Alma Thiesmeier from ZALF. "For medium rotations or lower wood prices, on the other hand, additional financial support is required to be competitive."

Modeling different scenarios for Brandenburg

To analyze the economic viability of these agroforestry systems, the research team used the "Agroforestry Calculator" modeling tool, which calculates the net present value of agroforestry systems under various framework conditions. The focus was on scenarios that compare different woodchip prices and subsidies. The study shows that current subsidies under eco-scheme 3 are not sufficient to incentivize the implementation of agroforestry systems on better soils and with fluctuating prices.

A perspective for sustainable agriculture

According to ZALF, agroforestry systems offer great potential for sustainable agriculture. They could help farmers to maintain soil quality and biodiversity in the long term while remaining economically viable. Nevertheless, the economic attractiveness of these systems often remains dependent on state support programs. The research team therefore recommends an expansion of funding to make the introduction of these cultivation systems more attractive and thus contribute to more sustainable agriculture.

"Alley cropping systems can play a decisive role in making agriculture more future-proof and environmentally friendly," says Thiesmeier. "We hope that the results of our study will encourage politicians to provide suitable funding to promote the introduction of this cultivation method."

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The text has been carefully reviewed and revised in the light of the AI regulations at ZALF.



Agroforestry system with poplar strips on the farm of farmer Thomas Domin in the south of Brandenburg.

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Press contact:

Hendrik Schneider
Head of Press and Public Relations
Phone: + 49 (0) 33432 82-242
Mobile: + 49 (0) 151 405 455 00
E-Mail: public.relations@zalf.de

Scientific contact:

Alma Irma Maria Thiesmeier
Program Area 3 "Agricultural
Landscape Systems"
Phone: + 49 (0) 33432 82-485
E-mail: alma.thiesmeier@zalf.de

About the Leibniz Center for Agricultural Landscape Research (ZALF) e. V. in Müncheberg, an institution of the Leibniz Association.

ZALF is researching the economically, ecologically and socially sustainable agriculture of the future - together with stakeholders from science, politics and practice.

Page | 4

As a contribution to overcoming global societal challenges such as climate change, food security, biodiversity conservation and resource scarcity, we develop and design cultivation systems in a landscape context that combine the need for crop production with sustainability. To this end, we combine complex landscape data with a unique set of experimental methods, new technologies, computer-aided models and socio-economic approaches.

ZALF research is systems research: from processes in soils, plants and water, to interrelationships at the field and landscape level, to global impacts and consideration of complex interactions between landscape, society and economy.
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