

5. Technical e-NEWSLETTER

BioTHOP PLA twine modified for hop-growing use

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In the context of the LIFE BioTHop project, Lankhorst Euronete Portugal was tasked with the development of a sustainable twine to guide and support hop plants. This would allow all biomass waste at the end of the hop season to be composted in an environmentally friendly waste management process. The project presented a series of challenges due to the nature of the hop crop, the weight of the plants and the exposure to the typical weather found in the regions where hops are grown. In partnership with IHPS and over three seasons, the product was iteratively developed and validated, leading to an optimal solution in terms of robustness and security for the hop plants and a sustainable solution for the growers and the environment.

Short description of the specific and technical information

The objective at hand was simple, develop a compostable twine that could support a hop vine during its growing season. When broken down this simple task shows some interesting insights as follows:

- Compostable. There is only a handful of polymers on the market which are compostable and can support a load. One of them is polylactic acid or PLA for short. This polymer is strong enough to carry loads, cheap enough to be used in agriculture, UV stable and had already been used to develop the Elite BIO twine. This was the starting point.
- Hop vine. The hop plant is a climbing vine, which develops many shoots in spring. A bundle of shoots, anywhere between 3 and 6, are wound around the twine which leads and supports them until the end of the season. A bundle of shoots can weigh over 10 kg upon harvest and there are two bundles per plant.
- Hop season. The hop season is relatively short, lasting only 6 months. On the other hand, hops are grown outdoors on trellises. Compostable twines had been developed and used so far in greenhouses; they had never been exposed to wind, rain or hail.

Season 1

The first season focused on testing different recipes focusing on strength, stiffness, raw materials and compostability. These tests were composed of 9 different twine types. The test spanned 15 hectares across 13 farms.

Table 1. Twine samples for 2020 field tests in the Savinja Valley			
Sample	Tenacity [gf/den]	Test area [ha]	Description
Horti Twine Pla 18000den WT01	2	1.4	Alternative raw material and put-up
Horti Twine Pla 22000den WT01	2	0.9	Alternative raw material and put-up
Horti Twine Pla 16660den YL24	2.2	2.1	Test thinner stronger twine
Horti Twine Pla 22000den WT01	2	1.2	Heavier stiffer twine
Horti Twine Pla 18000den YL24	2	4.4	Benchmark material yellow
Horti Twine Pla 18000den WT01	2	4.9	Benchmark material white
Horti Twine Pla 18000den AC	2	0.1	Additive for accelerated composting



Photo 1 and 2 2020 field test pictures (L. Luskar, IHPS)

The results from the first season were very promising. Composting could be achieved successfully without the addition of additives, even for the heaviest twines. Most farms showed a good performance for all twine types but the optimum twine size seemed to be centred around 500 m/kg. During the harvest and picking operation, some farmers noticed that the twine didn’t work as well on their picking machines. Improvements were needed in order to make the harvest operation as efficient as possible.

Season 2

The second season focused on two key factors, strength and efficiency. During the 2020 growing season, the development of the twine continued in order to bring a stronger product to the hop crops. This led to the twine for the 2021 season bearing a 10% higher strength. On the other hand, efficiency during both harvest and picking was also in focus. The twine was modified in order to bring additional stiffness to the product, allowing a better performance in harvesting operations. For the 2021 season, 4 twine types were tested across 20 hectares in 8 different farms.

Table 2. Twine samples for 2021 field tests in the Savinja Valley			
Sample	Tenacity [gf/den]	Test area [ha]	Description
Horti Twine Pla 18000den WT01	2.2	9.3	Stronger twine
Horti Twine Pla 18000den GR55	2.2	3.5	Stronger stiffer twine
Horti Twine Pla 20000den GR55	2	3.1	Stiffer twine
Horti Twine Pla 16660den GR55	2.2	3.8	Stronger stiffer twine for light hop varieties



Photo 3 and 4 2021 field test pictures (J. Polanšek, IHPS)

The results were again positive, with the behaviour of the twine closely resembling that of the PP twine already in use in hop crops. The twine was also tested in composting both by the farmers and by an independent laboratory with excellent results.

As of the end of 2021, Lankhorst Euronete Portugal is ready to launch the BioTHop twine commercially with its distribution partners across Europe.

Conclusion

This project has been a unique opportunity to bring together the collective know-how of IHPS, the hop farmers of the Savinja Valley and Lankhorst Euronete Portugal for the development of a product which will have a positive impact on the environment. European growers of hop twines will be able to compost their biomass using the twine developed in the LIFE BioTHop project from spring 2022.

For further information, please click <https://www.life-biothop.eu> or visit and follow us on our social networks, where we publish our news regularly:



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