



<b>General information</b>	
PPP number	TKI-AF-16165
Title	Biobased, biodegradable and sprayable cover material for horti- and agriculture
Roadmap/Umbrella	TKI AF Kernthema Circulair (voorheen TKI AF RM BbE)
Executive knowledge institution(s)	Wageningen Food & Biobased Research (WFBR) Wageningen Plant Research (WPR)
Research project leader (name + e-mail address)	Hans Mooibroek (hans.mooibroek@wur.nl)
Coordinator (on behalf of private parties)	Tetsuo Inoue, Nitto Denko Europe Technical Centre Sàrl
Government contact person	Jan van Esch (j.w.j.vanesch@minez.nl)
Start date	01-02-2017
End date	31-01-2019

<b>Approval coordinator/consortium</b>	
The coordinator has assessed the annual report on behalf of the consortium:	<input checked="" type="checkbox"/> approved <input type="checkbox"/> rejected
Possible feedback on the annual report:	N/A

<b>Short content description/aim PPS</b>
<p>The project objective is to develop a sprayable mulch formulation to be used for weed control and acceleration of plant growth. This liquid formulation should be able to form a polymer network that is impenetrable for weeds but permeable for moisture and is biodegradable with time in/on soil following EU standards currently under development. The main raw materials to be used for the sprayable mulch formulation are lignin, polyhydroxyalkanoate and mixture thereof. Part of the project focus of the optimization or modification of these materials to make them suitable for the targeted application.</p> <p>This project also aims at demonstrating the concept with at least two specific crops in different European geographical areas, namely the Netherlands and Switzerland.</p>

<b>Planning and progress</b>	
Is the PPP going according to plan? <sup>1</sup>	Yes
Have there been changes in the consortium/project partners?	<p>Yes.</p> <p>The facilities at Nitto Denko Europe Technical Centre Sàrl (NET), EPFL Innovation Park, Bâtiment G, Sud, CH-1015 Lausanne, have been closed.</p> <p>Under coordination by NET, the project activities are being taken over by Nitto Japan, 1-1-2, Shimohozumi, Ibaraki, Osaka 567-8680, Japan and Nitto Belgium NV, Eikelaarstraat 22, 3600 Genk, Belgium, which party is entrusted for experimental activities by Nitto Japan. For this purpose an Annex to the Consortium agreement is currently underway to formally arrange these changes.</p>
Is there a delay and/or deferred	There is some delay in mcl-PHA production at larger (100 L)

<sup>1</sup> If applicable, use the explanation from the financial project report

delivery date?	scale due to delayed delivery of the equipment revision and associated software. Due to the exchange of Nitto partners there is some delay in the analyses of smaller mcl-PHA latex samples provided.
Are there any substantive bottlenecks? Provide a brief description	Depending on the nature of fatty acids supplied (with variations in chain-lengths and number of double bonds) as co-substrates to the <i>Pseudomonas putida</i> mcl-PHA production strain, the resulting latex appeared to be rather sticky. This may cause difficulties for spraying. Therefore, additional DSP and purification steps are under consideration. It appears that based upon Techno-Economical Assessments (TEA) of similar processes from others the production price of the anticipated final spray formulation is still too high. An important part of the 2018 activities will be devoted to investigating measures to reduce these costs.
Are there any deviations from the projected budget?	No
Do you expect a patent application to arise from this PPP?	Possibly

#### **Current summary of the project for the website Kennisonline**

The current increase in food demand combined with the decrease of arable land puts pressure on agriculture to improve production yields. Agriculture films and more particularly mulching films serve this purpose since they allow weed suppression, reduce moisture loss from the soil, increase soil temperature and provide protection against erosion. These combined advantages lead to a reduced necessity of chemical weed control, a reduction of water consumption as well as faster crop development, thus answering societal and farmer needs. The major drawback, however, of most current commercial agriculture films are the problems associated with their disposal. Non-degradable polymers (such as the commonly used polyethylene), tend to accumulate as plastic waste, creating a serious problem of plastic waste management. Therefore, concerns about pollution associated with the use of non-renewable and non-degradable materials combined with changing regulation, call for "green" material alternatives in the field of agricultural films. Biobased and biodegradable mulching films are already known and commercially available. However, both their performances, which are still to be improved, and their too high price are hampering their adoption. The project's objective is to develop a sprayable mulch formulation to be used for weed control and acceleration of plant growth. This liquid formulation should be able to form a polymer network that is impenetrable for weeds but permeable for moisture and is biodegradable with time in/on soil following EU standards currently under development. Preliminary research shows that a combination of bio-based materials and proprietary technology from an Industrial Partner provides a possible solution as a technical and cost effective biodegradable sprayable cover material. This project also aims at demonstrating the concept with at least two specific crops in different European geographical areas, namely the Netherlands and Switzerland.

#### **Highlights:**

- The available *Pseudomonas putida* mcl-PHA production strain and fermentation and DSP processes were validated yielding samples for analyses and use by other partners.
- Initial Mock tests carried out by WPR on Garden cress provided a clear picture of the pH range (above pH 7) that can be sprayed directly on seedlings and surrounding soil.
- Partner Metsä Fibre Oy provided lignin and (For2) Tall oil samples for use in films and mcl-PHA production by WFBR.
- Partner Nitto Denko Lausanne has carried out test spray experiments in the open field to define basic requirements for the spraying equipment and for the properties of the spraying solution. Lignin was evaluated for water dispersity and stability. Required amounts and basic properties were checked by a model spray solution.

#### **Number of delivered products in 2017**

Academic articles	Reports	Articles in journals	Introductions/workshops
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N.a.	Regularly updated detailed interim progress reports	N.a.	N.a.
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**Appendix: Names of the products or a link to the products on a public website**

**Link naar Kennisonline/TKI AF:**

<http://agri.coolcowboys.nl/project/biobased-biodegradable-and-sprayable-cover-material-for-horti-and-agriculture/>

<https://www.wur.nl/en/Research-Results/kennisonline/Biobased-biodegradable-and-spray-able-cover-material-for-horti-and-agriculture.htm>

Akkoord Hans van der Kolk (Topsector secretaris)