

Novel single-treatment soil and root separator for complete physical control of perennial weeds

- return of root stocks and rhizomes as plant nutrients

Aarhus University,
Department of Agricultural Engineering

Technical Field

- Plant production
- Sustainable plant production
- Plant nutrient preservation.

Business opportunity

- Licensing opportunity
- Prototype development collaboration.

Current state of technology

An extensive research program has been processed providing proof of concept for central parts of the machine. Manufactures are invited to engage a further prototype of development collaboration.

Currently, extensive research is on-going for perennial effect of weed control efficacy. Field and biological evaluation and validation of prototype will be provided. In addition feasibility study based on field experimental data will be processed.

The technology is applicable for national Proof-of-concept funding in collaboration with the industrial partner.

Applications

- Organic plant production handling N (ammonia) loss from soil (uptake, emission and leaching)
- Sustainable plant production. Applicable for Integration Pest Management (IPM) strategy for reduction and elimination of Glyphosate dependency.

Commercial Value

Organic farmer:

The technology provides reduction of time and energy input and N loss. Complete control by one-pass treatment versus the limited control provided by state-of-the-art cultural methods including >3 time tillage and eradication by sunlight.

Overall, the technology is expected to achieve weed control efficiencies equal to post-harvest application of glyphosate - an essential sales argument for future end users and buyers of the technology.

Manufacturer:

The entire EU comprises approx. 165,000 organic farms with an average area of 38.7 ha. In EU, the organic area represents 4% of the total agricultural area. Latest statistics indicate increasing yearly EU production rate of 10-15% [1]. The market for the novel root separator is estimated to a minimum of 80.000 units in EU.

The Technology

Growers of agri- and horticultural crops urgently requests technology that effectively controls rootstocks and rhizomes of perennial weeds. The restricted herbicide dose rates makes it difficult to control certain species, and in organic plant production there is an urgent need for novel technology for control of perennial weeds.

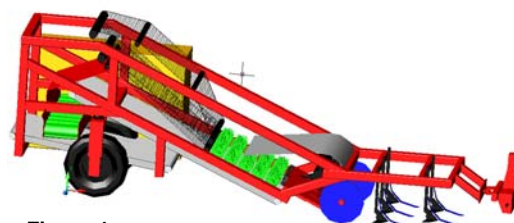


Figure 1:
Schematic diagram

The novel technology comprises a tractor mounted, PTO- and hydraulic driven soil tillage machine for growth inhibition of rootstocks and rhizomes of perennial weeds. In addition, the technology returns the roots and rhizomes to soil as degradable organic material, and the treated soil is placed ready for seed bed preparation.



Figure 2:

Typical infestation provides 100-200 g root dry matter of couch grass per m². The root dry matter contains approximately 1% N giving an estimate of 10-20 kg N/ha when returned as degradable or-organic material [2].

Intellectual Property Rights

An European patent application has been filled January 2009. EP 09001286. All Intellectual Property Rights are owned by Aarhus University, Denmark.

Inventors



Bo Melander

Senior Scientist - Department of Integrated Pest Management

Physical weed control in conventional and organic arable and horticultural crops. Investigations of the fundamental principles of mechanical and thermal weed control methods. Strategic research with physical, preventive and cultural control methods to define the most appropriate weed control strategy to the actual crop. Quantification of crop/weed interactions, weed population dynamics, and economic aspects in order to judge the agronomic consequences of non-chemical weed control. Botanical surveys of the vegetation on set-aside land. Non-chemical weed control in developing countries.



Michael Nørremark

Post.doc - Department of Agricultural Engineering

The main focus of research is on theory and applications in the area of applied agricultural robotics and precision agriculture, including the development of: Methods for automated physical and chemical weed control within crop rows. RTK-GPS based auto-steering and positioning of seeds. Computer vision based recognition of individual plants. Intelligent implement and boom sprayer controls. Ultra-precise application of pesticides. Web server and PC based vehicle and implement control



Erik Fløjgaard Kristensen

Academic Employee - Department of Agricultural Engineering

Techniques for drying of grain and seed. Harvesting, handling and application of non-food crops and energy crops. Methods for non-chemical weed control.

References

1. http://ec.europa.eu/agriculture/organic/home_da
2. Bednarek, W; Bednarek, H; Dresler, S, 2009, 'Content of various forms of nitrogen and absorption of this element by cocksfoot grass, depending on meteorological conditions', J. elementol. vol. 14, no. 2 p: 207-216
3. Melander, B, Nørremark, M & Fløjgaard, E 2008, 'Exposure and destruction of Elymus repens rhizomes and Rumex crispus rootstocks', I Perennial weeds: a growing problem, Wageningen University p. 8-8.
4. Melander, B, Rasmussen, IA & Bårberi, P 2005, 'Integrating Physical and Cultural Methods of Weed Control - Examples from European Research', Weed Science, vol. 53, no. 3, p. 369-381.
5. Melander, B & Rasmussen, G 2001, 'Effects of cultural methods and physical weed control on intrarow weed numbers, manual weeding and marketable yield in direct-sown leek and bulb onion', Weed Research, vol. 41, no. 6, p. 491-508.
6. Melander, B & Rasmussen, K 2000, 'Reducing intrarow weed numbers in row crops by means of a biennial cultivation system', Weed Research, vol. 40, no. 2, p. 205-218.
7. Nørremark, M., Griepentrog, H. W., Nielsen, J., Søgaard, H. T 2008 The development and assessment of the accuracy of an autonomous GPS-based system for intra-row mechanical weed control in row crops. Biosystems Engineering 101 (4), p. 396-410.
8. Nørremark, M & Melander, B 2009, 'Development of tools for automated physical weed control', ICROFS News, vol. 1, p. 2-3.

Contactperson:



AARHUS UNIVERSITET

Kristine Kjer Hansen

University of Aarhus

Phone: + 45 8942 6864

E-mail: kkh@adm.au.dk