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ICROFS news

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Newsletter from the International Centre for Research in Organic Food Systems

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ICROFS
International Centre for Research in Organic Food Systems

The new ICROFS web site has been launched

By Niels Halberg, Director of ICROFS

The new ICROFS web site has been released. Furthermore, on occasion of the BioFach 2009 World Fair, ICROFS has launshed a new type of publications: ICROFS fact sheets.

Welcome to ICROFS' second international newsletter in its new form. ICROFS has launched its new web site, owing to the Centre's international mandate and organisational status, as given by the Danish Ministry of Food, Agriculture and Fisheries.

The web site, www.icrofs.org, seeks to reflect ICROFS' international status by including information on research activities, coordination efforts, research publications and newsletters, and links to international and European research programmes.

The new web site includes relevant and updated information on research activities in organic farming and food systems, and the web portal presents the Centre's the new organisation: the international board and the national programme committee.

The redesigned web site will be further developed and we appreciate your comments (please E-mail our webmaster). From now on, we will develop the Danish counterpart to icrofs.org, *viz.* www.icrofs.dk, which will be published on the Internet soon.

Until then, we kindly ask Danish speaking users to go to www.foejo.dk.

Visit ICROFS ' web site at www.icrofs.org. A new feature is the search field in Organic Eprints directly from ICROFS' web platform.

Your input to *ICROFSnews*

In front of you is the first issue of *ICROFS news* in pdf-format.

ICROFS listen to our readers's response with pleasure, as we are here for you! Therefore, any responses are more than welcome, be it about the new format, suggestions to inprovements, changes, content and more.

Contact us: simon.rebsdorf@icrofs.org

ICROFS shared expertise at BioFach

On February 19-22. 2009, the international organic market met for the twentieth time at BioFach, the global organic trade fair.

ICROFS participated actively at BioFach 2009, offering expertise and sharing experience with organic research on the international platform for representatives from the organic world.

This year, Denmark has been appointed "Country of the Year 2009." Therefore, the Danish Ministry of Food and Agriculture and ICROFS represented Denmark jointly at a common fair booth.

BioFach research seminars

Researchers affiliated with ICROFS research projects participated in a series of seminars, where a number of topics with relevance to organic commerce and consumers were discussed on a research basis. The seminars were co-arranged by ICROFS.

Among the topics were food security, organics and climate challenges, organic food quality and health.

The fair Biofach is always held in Nuremberg, Germany, and gathers around 2,700 exhibitors and 46,000 visitors from more than 120 countries each year.

The Board met in Nuremberg

The international board of ICROFS met for the second time during the BioFach 2009 world Fair to continue discussions of the strategy, vision and mission of ICROFS.

New fact sheets

In the vital effort of communicating research in organic food systems, ICROFS has made a new type of publications: ICROFS fact sheets. These fact sheets sum up the latest research results in selected areas within organic agriculture and food systems.

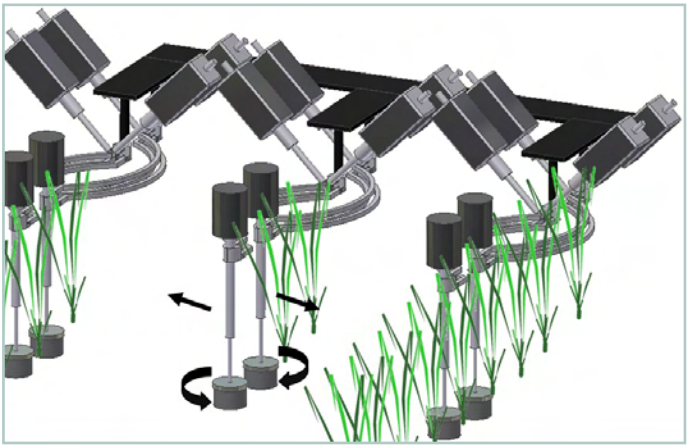
On occasion of the BioFach 2009 fair, ICROFS has made three fact sheets entitled: How organic Agriculture May Feed the World, Organic Agriculture and Climate Challenges, and Organic Food Quality and Health. Read them at www.icrofs.org.

Scientific officer, Lizzie M. Jespersen, stands by the counter at ICROFS' BioFach booth. The HortiBot to the left attracted numerous interested visitors at the organic world fair.

Development of tools for automated physical weed control

By Michael Nørremark, Post.doc, Department of Agricultural Engineering, and Bo Melander, senior scientist, Department of Integrated Pest Management, Research Centre Flakkebjerg, both at University of Aarhus, Denmark

Tools are being developed for automated physical weed control in the close to crop area. The most promising weed control concepts are the so-called high precision tillage solutions and thermal weed control by pulsed lasers.



Three row steel brush conceptual tool for close to crop weed control (student project by Thomas Jensen and Anders Ø. Clausen, University of Southern Denmark).

Novel implements for intra-row flaming and mechanical weed control are commercialised (www.fp-engin.dk, www.garford.com). The demand to future technology is properties to control weeds in the near proximity of crop plants without reducing yield. In this study, 30 concepts for close to crop weed control were identified and evaluated by various aspects. The most promising weed control concepts were so-called high precision tillage solutions and thermal weed control by pulsed lasers.

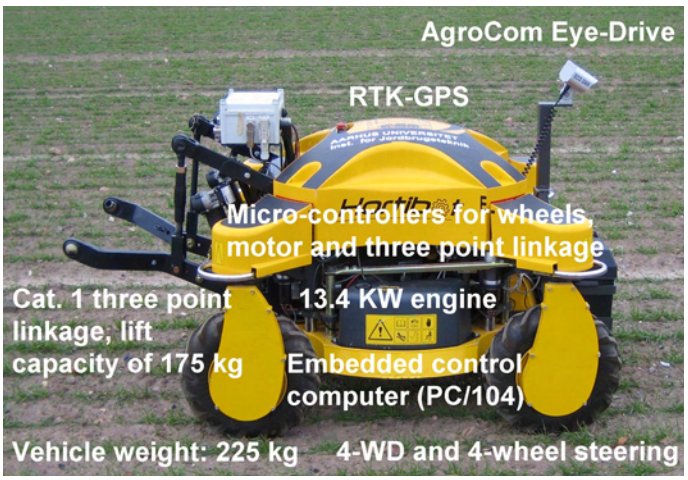
Technology development with regard to organic principles

In organic crop production, weeds in the close to crop area are controlled by time consuming and monotone manual weeding in order to reach high crop yield. Consequently, there is a need for new technologies capable of carrying out effective physical weed control in near proximity to individual crop plants in order to assure the economics in organic crop production. Compared with traditional tractor pulled weed controlling implements, light weight and low speed autonomous vehicles equipped with advanced sensor and control systems provide opportunities for weed control operations close to crop. Consequently, novel weed control tools have to be identified and evaluated for those vehicles.

The aim of this study was to identify potential and conceptual tools for close to crop weed control in narrow intra-row spaced crops that can be carried and powered by an autonomous vehicle - HortiBot (www.hortibot.dk). The process of Pahl and Beitz's concept selection matrix (CSM) has in 2006, in the same context, been introduced to help adding structure to a development process for automatic intra-row weed control in sugar beet. This second study provides novelty to evaluation criteria, scenario, and conceptual tools. More evaluators with engineering, practical and agricultural machine manufacturing background are required to reach higher significance of the evaluation process.

Technologies for close to crop weed control

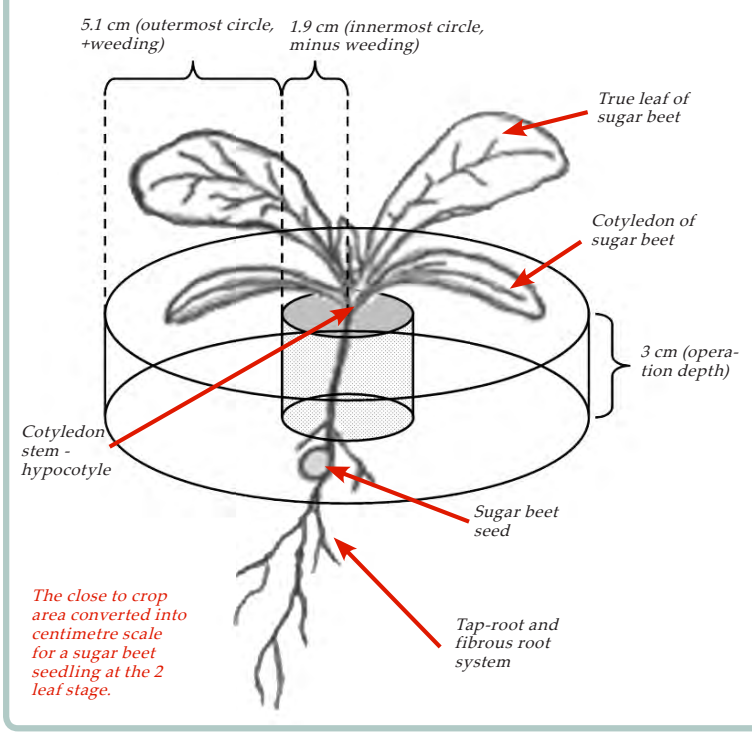
The technologies in selection counted 30 conceptual solutions and ranged from steered finger weeders and tines over mulching with biological material to lasers and air jets with abrasive powder (derived from patents, literature, product data sheets and personal inventions). Concepts facilitated high degree of selectivity, meaning that weeds are selected and crop yield reduction avoided. The list of tools is too long to present in this short communication but will be presented in a peer reviewed paper with additional line drawings of conceptual tools and electromechanical and control suggestions enabling the tools to navigate as close to crop as possible. High accuracy of the crop plant positioning is a prerequisite for all tools to operate. In the selected scenario, crop plants are first recognized and then positioned by a computer vision system (research on this topic is on-going in parallel to the development of tools).



HortiBot - a research platform for developing novel control strategies and applications for agricultural robots.

Evaluation criteria

The concept selection matrix lists the evaluation criteria down the left side of the matrix. Tool concepts are listed across the top. Each evalua-



Definition of "close to crop area"

The radii of the foliage cover, the vertical and horizontal root growth distribution and the strength of crop seedling establishment define the size of the close-to-crop area.

It is a circular area with center at the germinated stem of individual crop plants. Weeds germinating close to individual crop plants provide most negative impact on crop yield.

The timing of physical control of weeds in the close-to-crop area to minimize crop yield loss should be at the 2-4 leaf stage of weeds.

tion criteria have priority relative to each other, and a measurable target value. The evaluation criteria and measurable target values were defined by agronomic, engineering and feasibility specifications.
In the table to the right, the list of criteria sections, i.e. sections include many sub-criteria with related measurable target values.

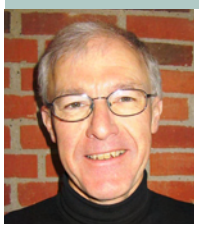
The priority is multiplied by the assessed strength of the relationship between each evaluation criteria and the tool concept. A seven level scale for assessing the relationship was used for a finer scoring system. The derived values in each column were summed in the bottom row as a rating. The preferred concept(s) was the one(s) with the highest rating. The strength of relationship was based on data from literature or product data sheets, but in some cases the strength was based on assumptions only. Therefore due to the unknown overall performance of some concepts uncertainty was considered and included for each concept investigated giving a variation to the rating value.

Conclusion

From the CSM process clearly superior concepts emerged. High precision tillage solutions and thermal weed control by pulsed lasers for eradication of stem or main shoot were the most promising weed control concepts in this preliminary study. However, it should be noticed that this particular conclusion is only valid because the primary focus was on weed control efficiency, ability to target all weeds close to crop, and spatial resolution.

Advantages of the CSM process are; i) rather than simply list the positive and negative aspects of each concept, one by one, a matrix of weighted performance targets versus concepts helps address multiple factors simultaneously, ii) results can easily be reviewed and altered in a spreadsheet by many people either at the same time or separately, and perhaps most importantly iii) the history of the process is documented.

Resolution:	*Spatial resolution or ability to target individual weed plants or even plant parts*
Efficiency:	*Ability to control both annual and perennial weeds*
Accessibility:	*To target weeds underneath crop leaves and close to crop*
Energy consumption:	*Energy for the weed control operation including draft force*
Work rate:	*Treated weeds per unit of time or area*
Applicability:	*Ability to be carried and powered by the HortiBot*
Costs:	*Fixed and variable costs*
Auxiliary rate:	*Labour time allocated to assist the weeding tool*
Adaptation:	*Adaptation to various field and crop growing conditions*
Ease of construction:	*Level of difficulty concerning construction of electromechanically and control systems*



Research in vegetable proteins for diets for organic trout

By Alfred Jokumsen, Senior Advisory Scientist, Technical University of Denmark, National Institute of Aquatic Resources;
The North Sea Science Park, Hirtshals.

Danish organic protein crops may be used as ingredients in feed for organic fish in the near future. It is necessary to replace as much as possible of the fish meal protein with competitive organic vegetable protein sources with high protein content.

In a few years, Danish organic protein crops may be used as ingredients in feed for organic fish in partial replacement of fish meal protein. Fish meal is currently the primary protein source in feed for organic fish. Fish meal is manufactured by industrial fish caught among sustainable stocks, but even natural this protein source is not defined as organic and is as well a limited resource.

Therefore, it is necessary to replace as much as possible of the fish meal protein with competitive organic vegetable protein sources with high protein content as well as a relevant amino acid composition compared to that in fish meal. Opposite optimization of conventional fish feed the regulation does not allow addition of artificial amino acids to feed for organic fish.

Protein Concentrates

Grown plant crops generally have lower protein contents than fish meal. Due to this fact only a limited part of the fish meal can be replaced by plant protein. The degree of replacement is to a great extent determined by available technologies, which are adequate for manufacturing protein concentrates of specific crops in accordance with the current organic regulations.

During the current research we have succeeded in concentrating the protein content in organic peas, rape, lupine and horse beans to 40 – 50 %, which however, are lower than the protein content of 70 - 72 % in fish meal.

Growth and Digestibility

Feeding experiments with organic rainbow trout have been performed using 3 experimental diets (B, C and D), where fish meal was partially replaced by the protein concentrates given above and considering the best fitting amino acid profile. The control diet (A) was similar to the current commercial feed for organic trout, and with fish meal constituting about 53 % of the feed (picture 1).

Picture 1. Digestibility experiment with organic trouts.
Foto: A. Jokumsen

The experiment investigated as well the effect of changing the protein/fat-ratio in the diet from 48/25 to 45/28 as the effect of reducing the fish meal content from 53 to 25 % of the diet and replacing this fraction by the vegetable protein concentrates.

The growth experiments indicated a positive effect of changing the protein/fat-ratio from 48/25 to 45/28, i.e. a decrease in the protein content from 48 to 45 % and an increase in the content of oil from 25 to 28 % improved the growth performance of the fish.

Picture 2. The Organic Trout Farm Skravad Mølle between Viborg and Hobro, Denmark.
Foto: A. Jokumsen

The digestibility study showed the significant highest protein digestibility in diet D (93,2 %), in which the inclusion of fish meal was reduced from 53 % to 25 % of the diet and replaced by vegetable protein concentrates (Fig. 1).

However, the specific growth rate was highest in the control group (A) and significantly lowest in diet D. That means, that even a diet shows a high digestibility the composition of nutrients may influence the growth performance of the fish.

Perspectives

The yearly production of organic fish in Denmark is currently about 200 metric ton, but many traditional farms are about to convert to the organic concept (picture 3).

The research also includes case studies of existing Danish organic farm systems and management methods. In connection to the case studies selected test diets from the laboratory experiments are tested under commercial conditions.

Further information about health, prevention and treatment of disease are collected in cooperation with the veterinary inspector.

The influence of the experimental diets on the product quality of the organic fish includes objective sensory and biochemical analyses of the meat.

Thus, the research is primarily focused on the most critical areas in the chain connecting organic feed production, the organic farmers and the consumer.

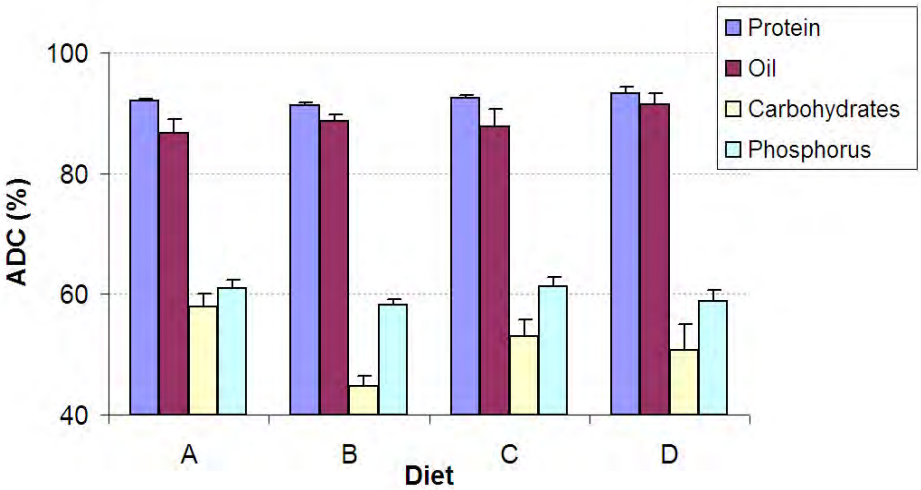


Fig. 1. Digestibility expressed by an approximated value, the Apparent Digestibility Coefficient, ADC as % of Protein, Oil, Carbohydrates and Phosphorus, respectively, in the 4 diets.

Organisation

TP Organics on a new platform

"TP Organics" is a new platform for organic food and farming research which joins the efforts of industry and civil society in defining organic research priorities and defending them *vis-à-vis* the policy-makers.

In December the Platform officially published the document – a Vision for Organic Food and Farming 2025.

Read the TP Organics Newsletter...

TP Organics workshop at BioFach

During this year's BioFach fair, TP Organics held a workshop entitled: "TP Organics towards a Strategic Research Agenda". The workshop was open to invited people only. Read the programme here... (at www.tporganics.eu).

Events

Danish FAO side-event in Rome

In collaboration with FAO and IFOAM, the UN Food and Agriculture Organisation, ICROFS is planning a side-event on April 22nd on behafl of the Danish Ministry of Agriculture, Food and Fisheries.

The occasion of the the side-event on organic food systems is the proposed FAO COAG meeting in Rome on April 22-25. COAG is the acronym for Committee on Agriculture.

Read the provisional agenda at www.fao.org.

Congresses

The 1st Nordic Organic Congress 2009

The first Nordic Organic Congress is held in Gothenburg, Sweden, on 18-20. May, 2009.

You can access the newsletter, and participants can enrol on the conference website.

The aim of the conference is to create a Nordic forum, focusing on organic foods and sustainable production. ICROFS has been involved in the planning of the content of the congress.

Denmark was "Organic Country of the Year 2009"

On February 19-22. 2009, the international organic market met for the twentieth time at BioFach, the global organic trade fair.

Read more on page 2 in this issue of ICROFS news: news from ICROFS.

First African Organic Conference in Uganda, May 2009

19.-22. May 2009, Uganda Martyrs University organises the "1st African Organic Conference 2009: Fast tracking sustainable development in Africa through harnessing Organic Agriculture and Biotechnology."

With the support of the Danish Development Research Network (DDRN), ICROFS has been able to contribute to this milestone event. ICROFS is responsible for organising some of the conference sessions.

They will be based on the recent UNEP/UNCTAD report 'Organic Agriculture and Food Security in Africa' and will include presentations and group discussions.

This report concludes that organic farming has substantial potentials

Congresses

for improved food security in Africa and the focus of the presentations and discussions will be how to achieve this potential.

The organisers invite interested actors to participate in the conference, held in Kapmala, Uganda.

Read more about the conference at www.icrofs.org and register for the event.

Publications

DinABio papers available online

Last year's conference in Clermont-Ferrand, "Development and Innovation in Organic Food and Farming," DinABio, has published a selection of 58 edited papers on the conference website.

The subtitle of the confeence on research in organic agriculture was "From the study of technical bottlenecks to the design of development models." More than 300 French speaking participants attended the conference and the arrangers have made a selection of 58 edited papers available on line frelly on the INRA website, www.inra.fr.

New ICROFS research fact sheets

In the ongoing effort of communicating research in organic food systems, ICROFS has made a new type of publications: ICROFS fact sheets.

These fact sheets sum up results from research in organic agriculture and food systems.

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The fact sheets can be downloaded from www.icrofs.org.