

## **Intra-row weed management in wide-row organic crops**

Applications are invited for a PhD fellowship/scholarship at Graduate School of Science and Technology, Aarhus University, Denmark, within the Agroecology programme. The position is available from 1 August 2018 or later.

### **Title:**

Intra-row weed management in wide-row organic crops

### **Research area and project description:**

Wide-row cropping systems for arable crops have gained great interest in Danish organic farming in recent years thanks to the introduction of automatic steering systems that enable accurate guidance of implements in the inter-row spaces of crops. In short, wide-row cropping makes room for more efficient weed control methods and better cover crop management. Wide-rows implies widening of the inter-row spacing of normally narrow-row crops, such as cereals, oil seed rape and pulses. Increased inter-row spacing allows the use of inter-row hoeing which can improve weeding effectiveness and ease the operation of mechanical weed control. Conventional crop production also seeks for non-chemical solutions because of a shrinking range of approved herbicides and increasing problems with herbicide resistance.

Despite that inter-row hoeing provides effective control of inter-row weeds, intra-row weeds, i.e. the weeds growing in the crop lines, still constitute a major challenge in a wide-row cropping system. The hoe shares do not directly affect intra-row weeds and these weeds need to be removed and/or suppressed by other means. The challenge of controlling intra-row weeds non-chemically also applies to traditional row crops such as sugar beets and maize.

The PhD project composes three research themes all related to intra-row weeds in wide-row cereals and sugar beets:

Theme 1 encompasses the impact and suppression of intra-row weeds surviving inter-row hoeing in cereals. It is not clear how surviving weeds interfere with crop yield. Competition studies are planned for studying the importance of surviving intra-row weeds both when organic and mineral fertilizers are used. The theme also involves studies on cultural measures (e.g. crop seed rate, fertilisation strategy, crop variety attributes) that can help minimising the influence of intra-row weeds.

Theme 2 covers weed and crop ecology in relation to the use of robotic weeding in sugar beets. Currently, a Danish manufacturer is developing a thermal weeding device for automatic removal of intra-row weeds in sugar beets. Studies are dealing with the lethal effects on weeds of different heating sources. Crop and weed effects following robotic thermal weeding will be evaluated and biological aspects of importance for effective conduction of the technology are scrutinized.

Theme 3 also deals with intra-row weeds in sugar beets but with the focus on the depletion of viable weed seeds in the bands where sugar beets are planned to grow. The depletion is achieved by a system approach where weed seed germination and subsequent removal are initiated the year before sugar beets are grown. Investigations will estimate the content of viable weed seeds before and after the strategies of depletion have been accomplished on sites with heavy weed infestations. The studies include weed responses at the species level in relation to soil disturbance timing and intensity including cover crop management between the rows planned for sugar beet growth.

It is anticipated that the PhD-project can yield 3-5 manuscripts for peer-review in relevant international journals; the exact number will of course depend on the success of experimentation and the ambitions of the student.

The section Crop Health under the Institute of Agroecology at Aarhus University wants to increase its activities on non-chemical weed control and to strengthen interaction with collaborators, such as AgroIntelli and Frank Poulsen Engineering, including other relevant stakeholders. The PhD project links closely to the work undertaken in the EU-project IWM PRAISE ([www.iwmpraise.eu](http://www.iwmpraise.eu)) under Horizon 2020 and the newly initiated national GUDP-project on Organic sugar beet production. The PhD-project also facilitates collaboration with other universities and helps improving the institute's international position in non-chemical weed management.

**Qualifications and specific competences:**

Applicants to the PhD position must have a relevant Master's degree and preferably worked on weed related issues in their master and/or bachelor theses.

**Place of Employment and Place of Work:**

The place of employment is Aarhus University, and the place of work is Research Centre Flakkebjerg, Forsøgsvej 1, DK-4200 Slagelse, Denmark.

**Contacts:**

Applicants seeking further information are invited to contact:

Associate professor Bo Melander, Department of Agroecology, Aarhus University, Forsøgsvej 1, DK-4200 Slagelse, Denmark. E-mail: [bo.melander@agro.au.dk](mailto:bo.melander@agro.au.dk).

## Application procedures

### Before you apply

**Information and attachments:**

Please be aware that you must have all relevant appendices, attachments, addresses for referees, etc. ready when you apply, as the entire application must be uploaded to the system in one go.

**Documentation of language skills:**

The English language requirement at Graduates School of Science and Technology is comparable to an "English B level" in the Danish upper secondary school ("gymnasium").

English language qualifications comparable to an "English B level" is documented by one of the following tests:

- **TOEFL test**, minimum score: 560 (paper-based test) or 83 (internet-based test). The paper-based test must have a "total score". From August call 2019, GSST no longer accepts the paper-based test.  
Aarhus University does not accept the TOEFL ITP test. **Aarhus University's TOEFL code is 8935**. You must request that the test centre send your test results to Aarhus University, in order to enable verification of your test results.
- **IELTS (academic) test**, minimum average score: 6.5 points
- **Cambridge English Language Assessment:**  
Cambridge Certificate of Proficiency (CPE)  
Cambridge English: Certificate of Advanced English with grade A,B or C (CAE)  
Cambridge English: First Certificate with grade A (FCE)

**When to take the test and how to upload the documentation:**

The test result must not be more than two years old at the time of application.

The English language test should be taken before applying for admission and uploaded under “language skills documentation” in the online application form.

It is possible to apply for admission before you have taken the test. In this case documentation stating that you have signed up for a test (please state expected submission date) must be uploaded. If the test result is not part of the original application the test result is to be sent to [sphd@psys.au.dk](mailto:sphd@psys.au.dk) no later than one month after the application deadline.

### **The following applicants are exempted from documenting their English qualifications/taking a test:**

- Applicants with citizenship from the following countries: Australia, Canada, Ireland, New Zealand, United Kingdom, United States, or one of the Nordic countries (Denmark, Finland, Iceland, Norway or Sweden).
- Applicants with a Bachelor’s or Master’s programme completed in Australia, Canada, Ireland, New Zealand, United Kingdom, or United States. In this case, please upload your Bachelor’s or Master’s diploma under the section “Language skills documentation”.
- Applicants with a Bachelor’s or Master’s programme completed at Aarhus University for which the requirement was English B level at the time of admission. In this case, please upload your Bachelor’s or Master’s diploma under the section “Language skills documentation”.
- Applicants able to document that English was the language of instruction during the whole period of their Bachelor’s and/or Master’s programme. This must be documented by uploading an official document from the institution stating this under “language skills documentation”. The onus is on the applicant to provide this information as GSST will not pursue information regarding language of instruction for any programmes or institutions.

The programme committee may request further information or invite the applicant to attend an interview.

### **How to apply:**

#### **1) Find the application form:**

Go to <http://talent.au.dk/phd/scienceandtechnology/opencalls/>

Choose May 2018 Call with deadline 1 May 2018 at 11.59 PM MET.

You will be directed to the call, and must choose the programme 'Agroecology'

#### **2) Fill in the following information:**

- Personal information
- Academic background
- Admission
- Financing (if any)
- Study: In the dropdown menu you must choose the project: "Intra-row weed management in wide-row organic crops"
- Source (how you found out about the call)

Next to some of the information fields you will find a number. Click on the number to get further directions on how to fill in the information field/what information is needed.

#### **3) Application attachments:**

Please be aware that you cannot submit the application if one or several of these documents have not been uploaded.

If you wish to upload more than one document under each section, you must scan/merge all documents into one large PDF file and upload this. Please note that we reserve the right to remove scientific papers, large reports, theses and the like. Instead you can indicate a URL where the information is available.

Please note that all information in the application must be in Danish or English.  
As a minimum all applications must include (pdf-files only, max. 20 MB, no zip):

- One reference (template for references)
- Curriculum vitae,
- Motivation (max. 1 page)
- Transcripts and diploma(s)
- Project description (½-4 pages). For technical reasons, you must upload a project description. When - as here - you apply for a specific project, please simply copy the project description above, and upload it as a PDF in the application. If you wish to, you can indicate an URL where further information can be found. Please note that we reserve the right to remove scientific papers, large reports, theses and the like.
- Documentation of language skills if required.

After submission of the application, you will receive a confirmation e-mail with an application ID, you should use for reference if needed. The e-mail will also include a link to the application – GSST urges you to check that all mandatory data, marked with an asterisk (\*), is registered correctly and all attached files are readable. In case of significant errors, you should reply to the confirmation e-mail with the correct details before the application deadline.

**GSST reserves the right to verify the authenticity of your educational diploma and transcripts:**

- Request additional information to verify an application.
- Reject the application if it is proven, or if the University has reasonable belief, that the information provided is false or if the applicant refuses to provide the requested information, whether or not an offer has already been made.
- For further information on applying, assessment procedures, etc. please see the GSST application guide [here](#)

Please note:

- The programme committee may request further information or invite the applicant to attend an interview.
- The project will only be initiated if final funding (from GSST/the faculty) is secured.

All interested candidates are encouraged to apply, regardless of their personal background.