

Supervising high-school projects – a way to combine outreach and recruitment with development of communication skills

- initial contact via “kemilektorsnätverket”, a chemistry teacher (PhD) asked for possibilities for high-school students to do their high-school project (GA-arbete) at SLU
- decided to appoint junior staff (PhD-students students) as supervisors for GA-projects to strengthen their communication skills, in line with a report from Lund University “Naturvetares generella kompetenser och anställningsbarhet [Generic Competencies and Employability of Science Alumni]”, <http://lup.lub.lu.se/record/1729326>
- encourage high-school teacher, high-school students and supervisors to aim for participation in “Utställningen unga forskare”, <https://ungaforskare.se/utställningen/> (2010, Raquel Asplund from Bromma Gymnasieskola, made it to the Swedish final with her GA-project on mosquito olfaction)
- From 2016, interest to carry out GA-project at SLU Alnarp has grown “avalanche-like”, making it necessary to try to find a working model to fulfil at least part of the demand

Facts 2018

- 2 High-schools; Polhemsskolan and Spyken, Lund
- 3 contact persons (high school teachers) in Lund
- 2 contact persons at SLU Alnarp
- 11 GA-supervisors at SLU Alnarp
- 11 suggested GA-projects, each supervisor prepared to take two groups of students (one from each school), resulted in 22 GA-projects! Each project was done by 2-3 high school students, that means that more than 40 students got a very positive experience of SLU to bring back to their school, friends and families
- 3 departments at SLU Alnarp were involved with PhD/postdoctoral students as supervisors

Present structure “Make your GA-project at SLU Alnarp”

- March:** SLU contact person give presentations at the high schools and introduce the GA-projects
- April:** Meeting at SLU with high school teachers and supervisors. Contact high school teacher presents everything necessary to know about supervising a GA-project
- April:** High school students choose their GA-project
- May:** High school students contact supervisor and decide a first meeting at campus Alnarp
- May/June:** High school students and supervisor together establish a time plan for the GA-project
- June/November:** Experimental part (around 3-4 days) of the GA-project is done
- December:** Follow-up meeting with high school teachers and supervisors to discuss “The good, the bad and the ugly”, that is; what went good, what was less good and is necessary to improve until next year
- Januari:** Active recruitment of supervisors for the coming GA-projects
- April:** Dead-line for High school students from last year GA-project to finalize their report

Future

- Include supervision of GA-projects in a PhD course
- Include High schools in Malmö, Helsingborg
- Engage PhD/postdoctoral students from all departments at SLU Alnarp


GA - GYI

kan vår pedagogisk improvisation
på tema
kommunikation&rekrytering
användas

Marie Bengtsson

Kemilektorslänken 2009 - 2012

Kungliga Vetenskapsakademiens samt Marianne och Marcus Wallenbergs Stiftelse, program för forskningsnära lärande av kemi på gymnasiet



Anna Smedja Bäcklund, Karlstad
Handledar gymnasieelever i
industrinära projekt vid Karlstads
universitet.

Christer Gruvberg, Göteborg
Expert på kemiska experiment i
mikroskala vid Hvitfeldtska Gymnasiet
och länkar till Göteborgs universitet.

Tomas Brandberg, Borås
Länkar Bäckängsgymnasiet till
Högskolan i Borås.

Klas Broo, Falkenberg
Forskar på Linköpings universitet med
gymnasieelever från Falkenberg.

Martin Lundqvist, Klippan
Laborerar med gymnasie- och
högstadiielever i Klippan samt länkar
till Kemikentrum i Lund.

Nitsa Kiriakidou, Lund
Länkar Polhemsgymnasiet till
Kemikentrum i Lund.

Tobias Sparrman, Skellefteå
Laborerar vid Baldersgymnasiet i
Skellefteå och länkar skolan till Umeå
universitet.

Joakim Westberg, Gävle
Läser gymnasieelever vid Vasaskolan i
Gävle följa bioteknikforskning vid KTH.

Emma Johansson, Uppsala
Utvecklar, tillsammans med Helena
Danielsson Thorell, Kemilärarguiden.
Länkar Rosendalsgymnasiet till Uppsala
universitet.

Helena Danielsson Thorell, Stockholm
Utvecklar, tillsammans med Emma
Johansson, Kemilärarguiden. Länk på
Kungsholmens Gymnasium.

Malin Nilsson, Tumba
Utvecklar formativt lärande bedömning
vid Tumba gymnasium.

Malin
Nilsson

Nitsa
Kiriakidou

Gymnasiearbete (GA) 2011 - Bromma gymnasium

Hur hittar malariamyggan (*Anopheles Gambie*) mig?



Bild 9. Försöksperson i plastpåse med fyra filter vid påsens ända.

Fler gymnasieelever vill och göra GA-arbete på SLU



Magnus Ehinger

18,082 subscribers

pedagogiskt samarbete kring flipped learning

För GA-engagemang i större och uthållig skala



Utbildningskonferens i Alnarp 2014



Communication as a scill and a tool for thinking

SUSANNE PELGER



Alumnundersökning våren 2010

Naturvetares generella kompetenser och anställningsbarhet

Susanne Pelger



Lunds universitet
Naturvetenskapliga fakulteten

Enkätfrågor

Hur värderas olika kompetenser i arbetslivet?

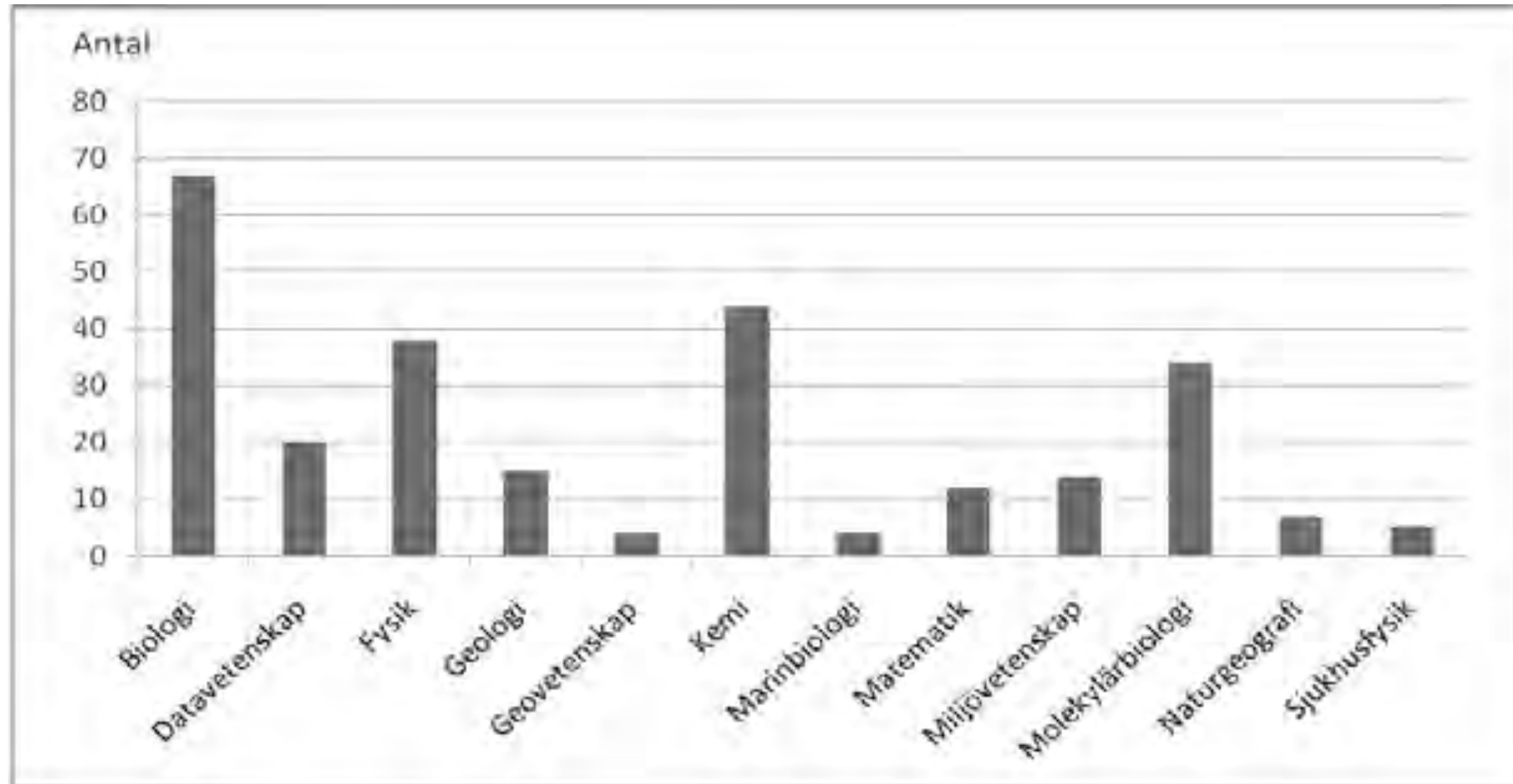
Hur väl har dessa kompetenser utvecklats under utbildningen?

Svar

Kommunikationsfärdigheter behöver utvecklas!! T ex

- förklara för icke-specialister
- argumentera
- debattera

Naturvetaralumner som besvarade enkäten



Totalt 265 svar (121 magister/master, 122 Fil dr)
43% kvinnor, 49% privat anställda, 31% forskning

Enkätfrågornas upplägg

För varje generell kompetens/förmåga fick alumnerna besvara två frågor:

1) 

I vilken utsträckning har du utvecklat följande förmåga under din utbildning?

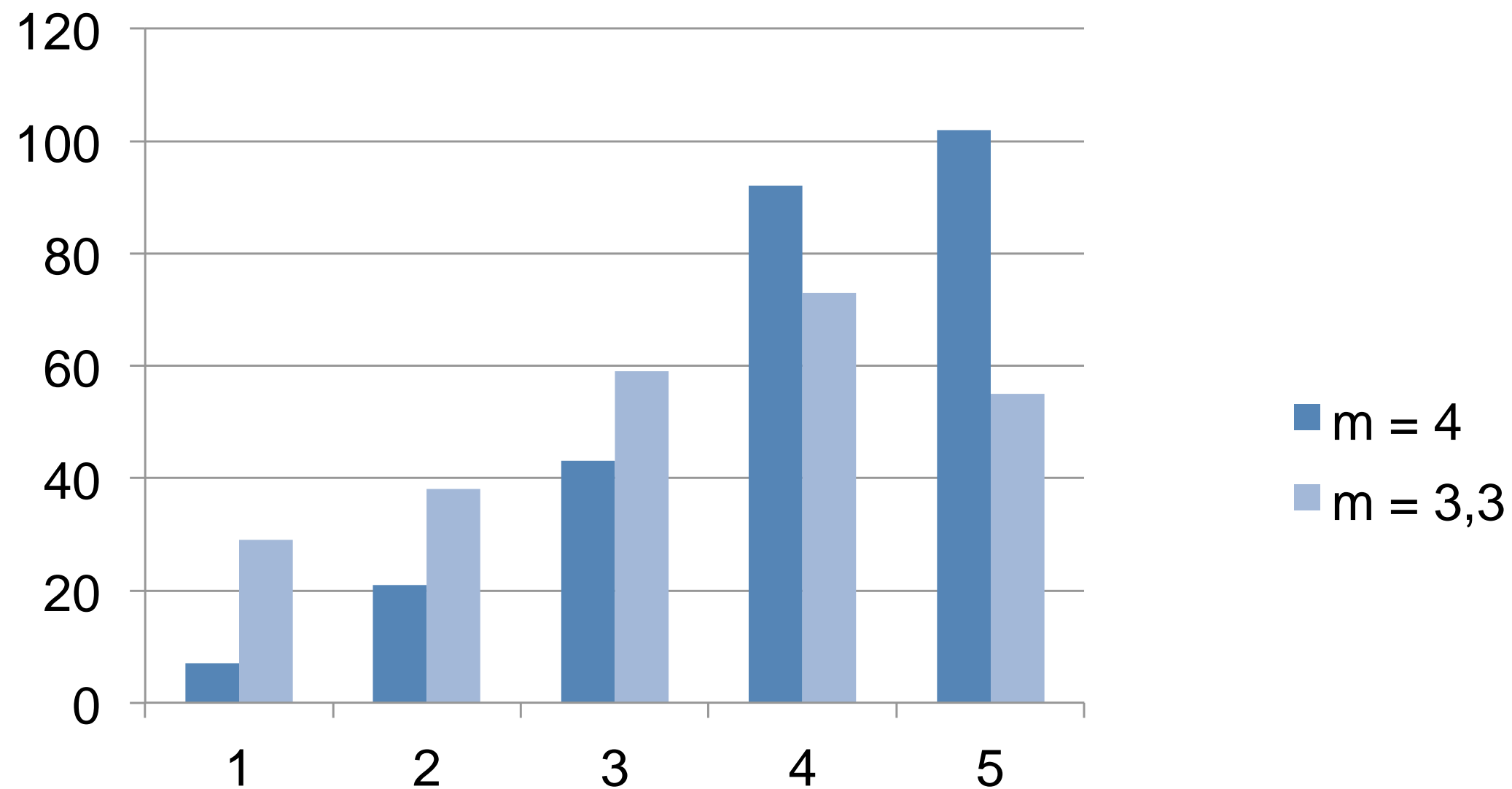
(1 = mycket liten, 5 = mycket stor)

2) 

Hur viktig anser du att denna förmåga är för en person som skall anställas på din arbetsplats?

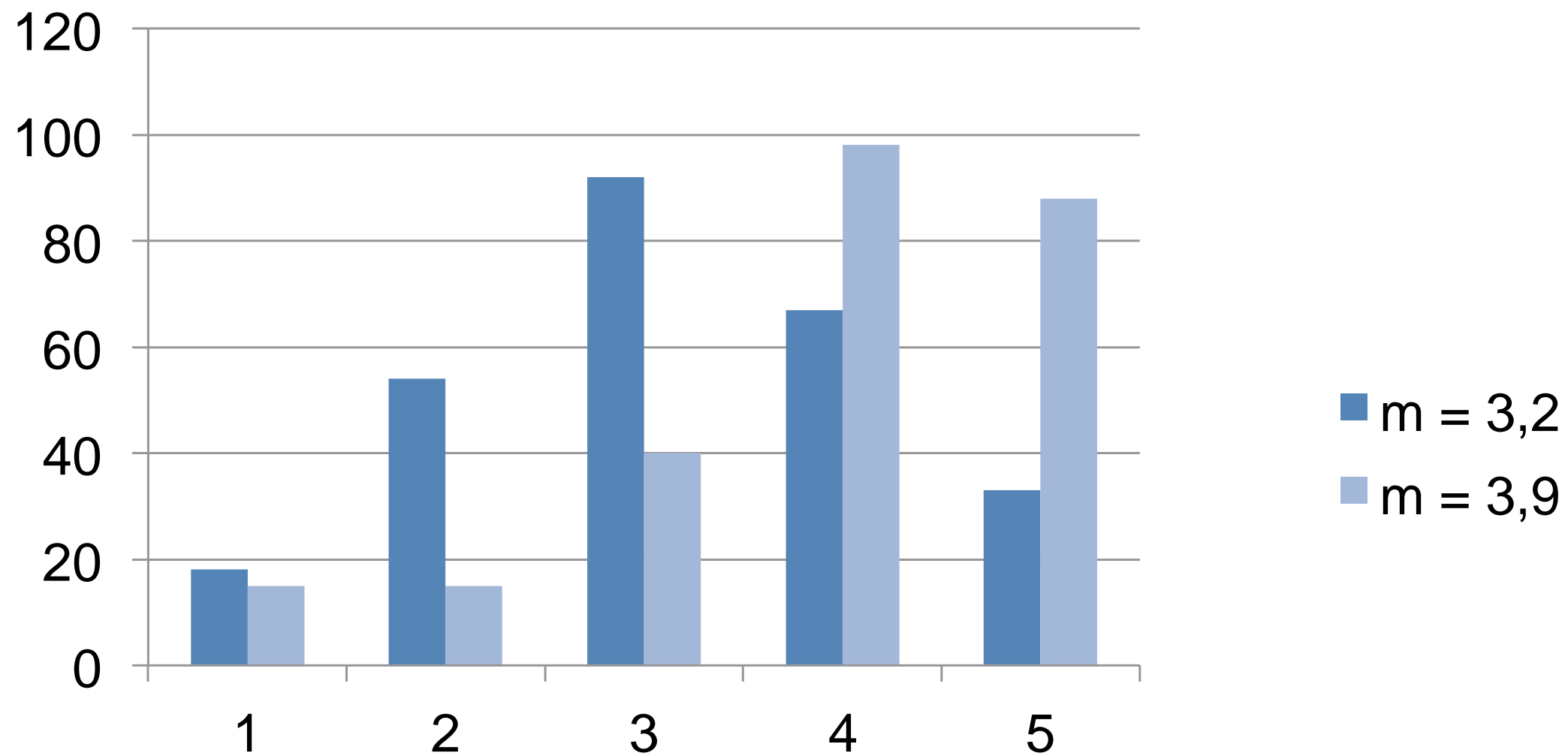
(1 = inte alls viktig, 5 = mycket viktig)

Skriva vetenskap



LUNDS
UNIVERSITET

Förklara för icke-specialister



LUNDS
UNIVERSITET

Vår idé - två flugor i en smäll



Studentgrupp 1:

Elever från gymnasieskolor i regionen

Mål: orientering om SLUs utbildningar

orientering om SLUs forskning

lyckas bra med gymnasiearbetet

anmäla gymnasiearbetet till Utställningen Unga Forskare

Studentgrupp 2:

Doktorander och postdoktorer vid SLU campus Alnarp

Mål: förklara för icke-specialister

dialog med olika grupper i samhället

träna på gymnasiepedagogik

Utveckling av "Gör ditt gymnasiearbete på SLU!"

2014: studiebesök på SLU av samtliga naturvetarlärare från Polhemsskolan i Lund

2015: Polhemsskolan

föredrag vid NV-mässa och presentation i sju klasser

4 GA-projekt, inst VSB

2016: Polhemsskolan

föredrag vid NV-mässa

4 GA-projekt, inst VSB

2017: Polhemsskolan och Spyken

föredrag vid NV-mässa på Polhem och för alla naturvetare i åk 2 på Spyken

Studiebesök samtliga naturvetarlärare från Spyken,

9 GA-projekt, inst VSB och BT

2018: Polhemsskolan och Spyken

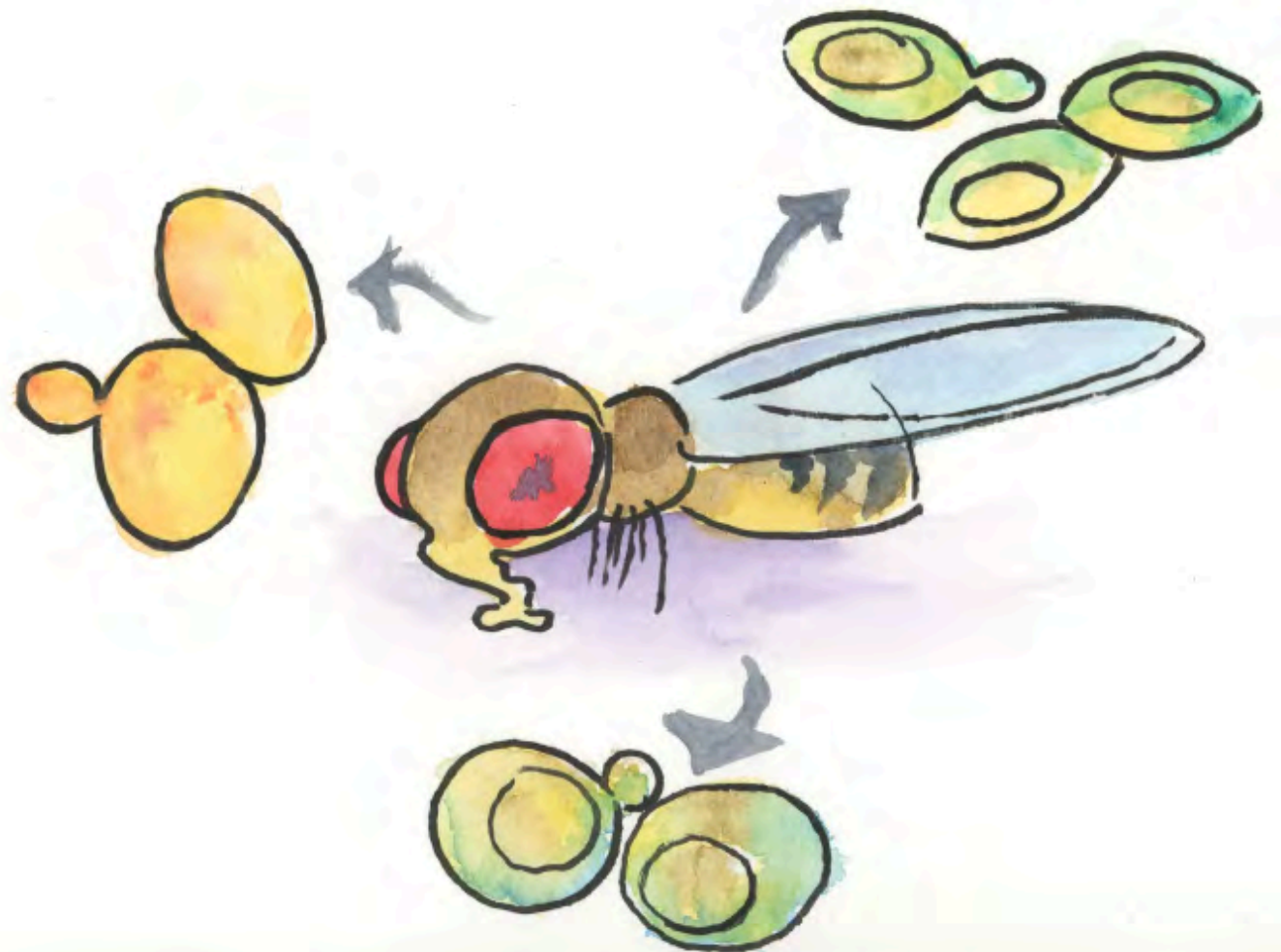
föredrag vid NV-mässa på Polhem och för alla naturvetare i åk 2 på Spyken

11 GA-projekt, inst VSB, BT och VF (dubblering av projekten pga efterfrågan)

GA-arbete 2018



Guillermo Rehermann, doktorand, Uruguay



Is there a specific yeast that attract *Drosophila suzukii*?

Projektbeskrivning Guillermo Rehermann

Titel: Is there a specific yeast that attract *Drosophila suzukii*?

Projektidé:

The spotted-wing drosophila (SWD), *Drosophila suzukii*, is an invasive insect pest impacting soft fruits along the globe, detected in Sweden in 2014. This student project will be part of a larger project to develop sustainable control techniques by manipulating adult behavior using natural volatile compounds of fruits and yeasts.

In this short project, we aim to determine which yeasts are important for SWD adults to find food and host sources.

Learning outcomes:

1. Learn to rear *Drosophila* flies
2. Distinguish between the sexes of *Drosophila suzukii*
3. Learn how to grow yeasts
4. Perform behavioral experiments with adult flies and yeast

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Upplägg "Gör ditt gymnasiearbete på SLU!"

april: lärare från Polhemsskolan och Spyken kommer till Alnarp. Magnus Ehinger presenterar konceptet för samtliga biträdande handledare

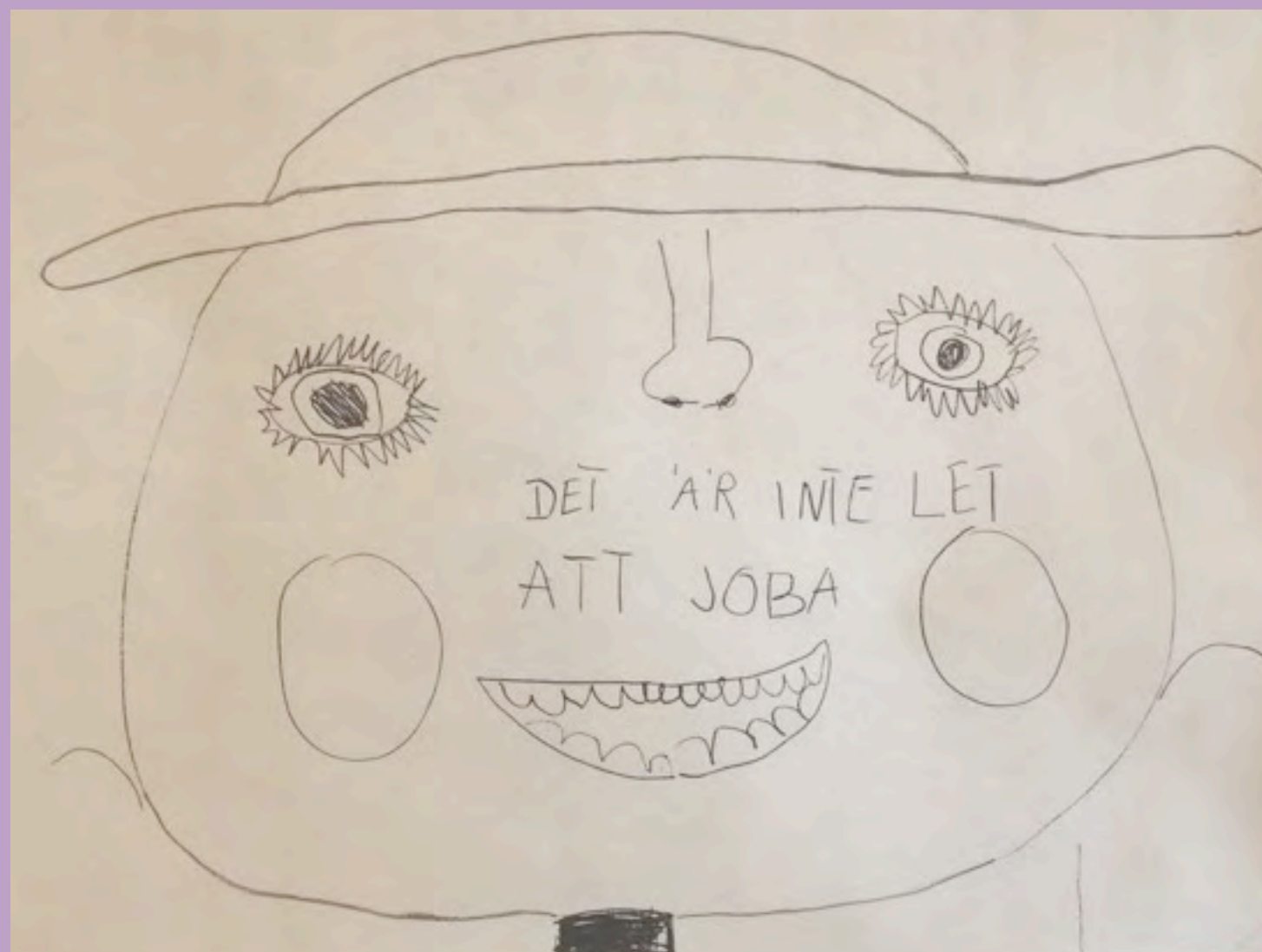
maj: elevgrupperna kontaktar sin handledare och bestämmer tid för en träff på campus Alnarp

maj/juni: tidsplan för GA-arbetet upprättas gemensamt av elever och handledare

juni-november: Någon gång under denna tidsperiod genomförs den praktiska delen av GA-arbetet

december: Follow-up meeting med lärarna från Polhemsskolan och Spyken, samtliga handledare deltar och diskuterar "The good, the bad and the ugly", vad som gick bra och vad som gick mindre bra och behöver förbättras till nästa år

januari: aktiv rekrytering av handledare och presentatör/presentatörer inför nästa omgång av GA-arbeten



Tack för att ni lyssnade

GA-Arbete 2020



Jenifer Sundar, doktorand, Indien



DNA Extraction from FTA Cards and Identification of Plant and Pathogen Species

Projektbeskrivning Jenifer Sundar

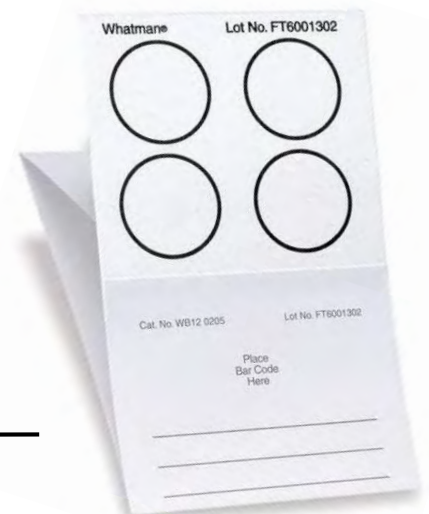
Titel: DNA Extraction from FTA Cards and Identification of Plant and Pathogen Species

Projektidé:

Phytophthora infestans is an oomycete that causes late blight disease in potato, a major crop around the world. In order to study the various genes involved during the interaction between the pathogen and the plant, infected potato leaves are collected. A novel and easy way is to use FTA cards that are specialized to preserve DNA for upto 17 years at room temperature. The protocol to get good quality DNA needs to be optimized for our samples. Additionally, we need to confirm that the extracted DNA belongs to the *P. infestans* so that future work can be conducted with the correct organisms.

Learning outcomes:

- 1) Optimize DNA extraction from FTA cards
- 2) Practise PCR to determine organisms
- 3) Learn Gel electrophoresis and data interpretation from it

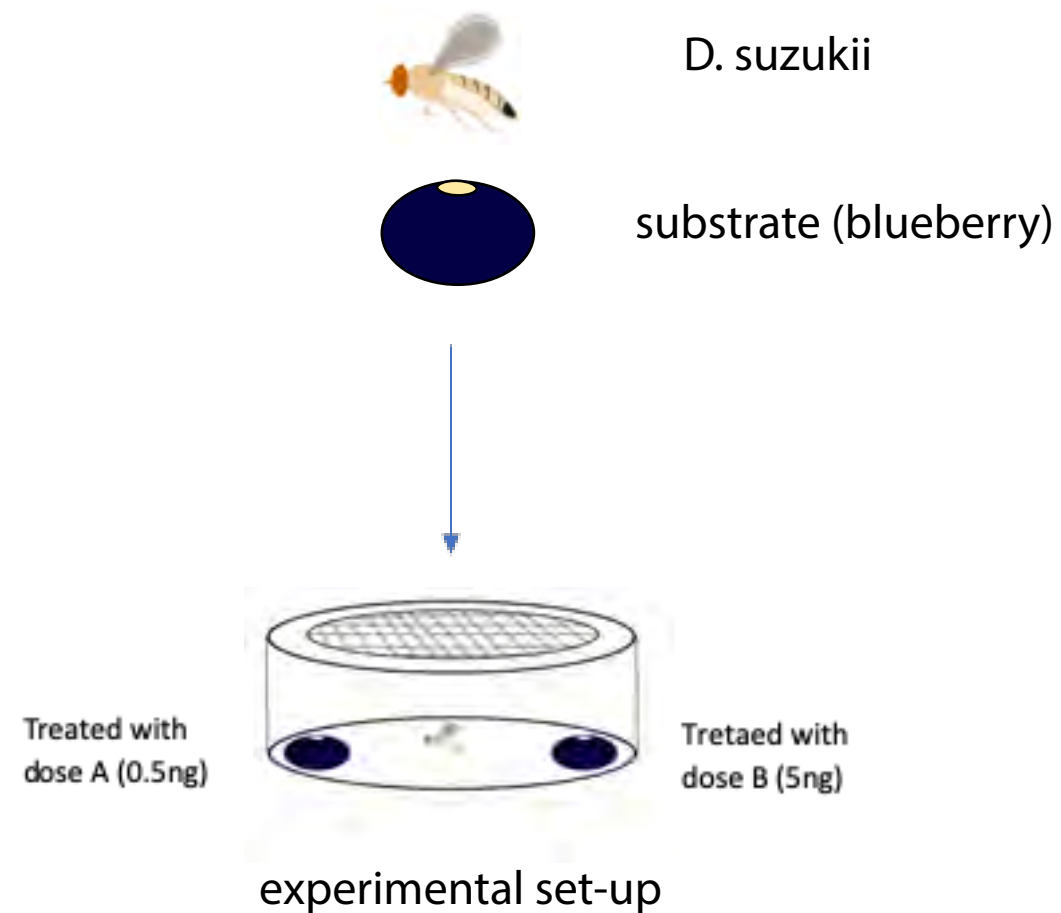


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GA-Arbete 2020



Charles Kwadha, doktorand, Kenya



Pheromone overdose, what does it mean for interspecies communication?

Projektbeskrivning Charles Kwadha

Titel: Pheromone overdose, what does it mean for interspecies communication?

Projektidé:

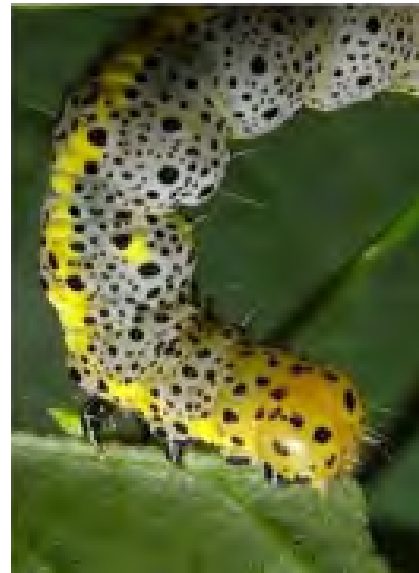
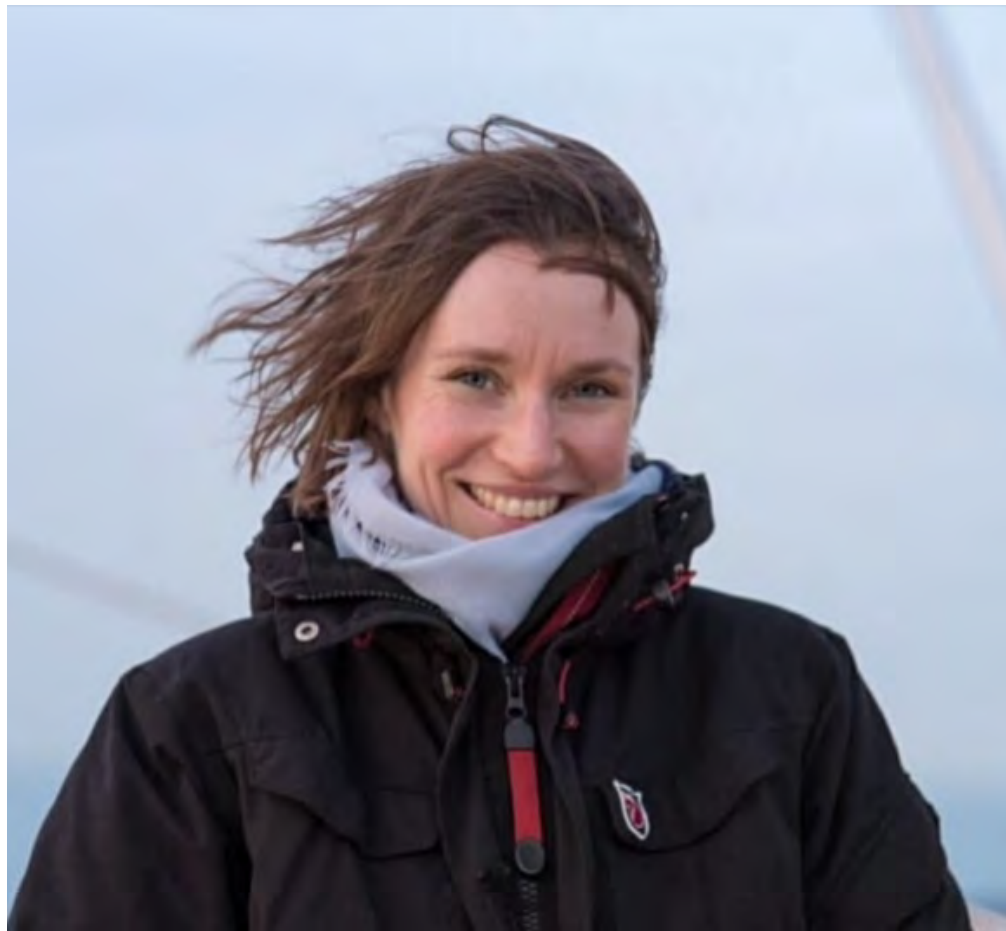
In the wild, different species of *Drosophila* coexist leading to interspecific interactions. *Drosophila melanogaster* and *D. suzukii* are two species which have been shown to co-exist.

Each species, produces and releases species-specific pheromone, which control communication and resource utilization within its members, but prevent similar activities in a closely related species. In the on-going project, we investigate how a pheromone released by *D. melanogaster* affect oviposition behavior in *D. suzukii*. Our preliminary data shows that gravid female of *D. suzukii* would avoid substrates treated with the pheromone. This pilot project, will help us to understand effect of the pheromone when applied at different doses.

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GA-Arbete 2020

Anne Muola, Postdoktor, Finland



Help us to understand the variation in plant-herbivore interactions

Participate in the global Herbivory Variability Network!

Projektbeskrivning Anne Muola

Titel: Help us to understand the variation in plant-herbivore interactions

Projektidé:

Plant-herbivore interactions vary dramatically both spatially and temporally, and at all levels of biological organization. Variability in species interactions is likely to have dramatic ecological and evolutionary consequences. Despite ecologists and evolutionary biologists have long time tried to explain and understand the variation in plant-herbivore interactions, we still today lack a unifying consensus limiting our fundamental understanding of how plants and herbivores interact.

To overcome this, there is a global network of scientists working together to understand what leads some plant species to have high variability and others to have lower variability in their interactions with herbivores. The overall aim is to collect data across the planet, across ecosystems, and across the plant phylogeny using standardized protocols.

In this project, students will contribute to the overall aim with 2-3 days of field work collecting data on the distribution of herbivory on selected plant species (2-3 different local plant species that will be selected together).

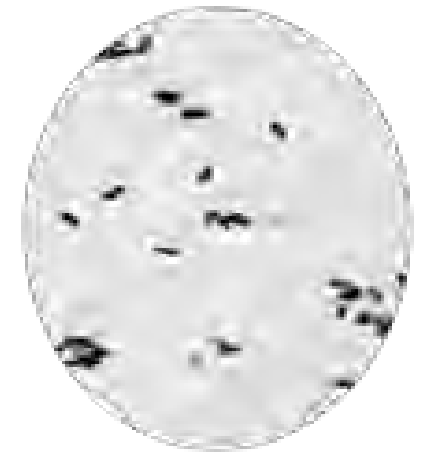
Kontaktuppgifter: anne.muola@slu.se

GA-Arbete 2020

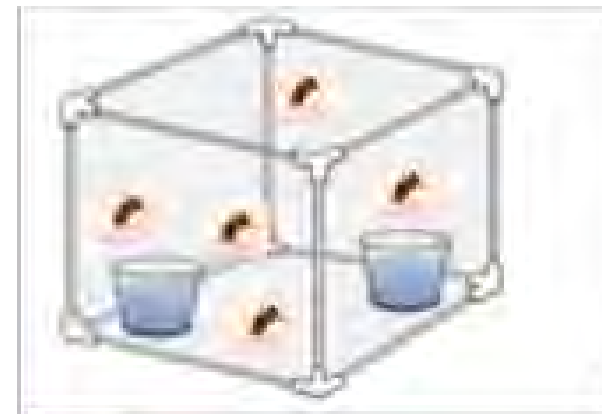
Zaid Khan, doktorand, Pakistan



Aedes aegypti



Aedes aegypti eggs



Experimental setup

Identification of Behaviorally Active Oviposition Odor of
Aedes aegypti

Projektbeskrivning Zaid Khan

Titel: Identification of behaviorally active oviposition odor of *Aedes aegypti*

Projektidé:

Aedes aegypti is a vector of dengue and yellow fever throughout the world. The mosquito's preference for ovipositing in human populated areas to emerge in high population densities makes *Ae. aegypti* a dangerous vector and prone to control by disrupting females' ability to locate oviposition sites. Oviposition site selection and oviposition in *Ae. aegypti* is primarily driven by chemical cues for which they use odorant receptors (Ors) present in antenna of mosquito. The oviposition preference of gravid mosquitoes will be analyzed in a two-choice assay.

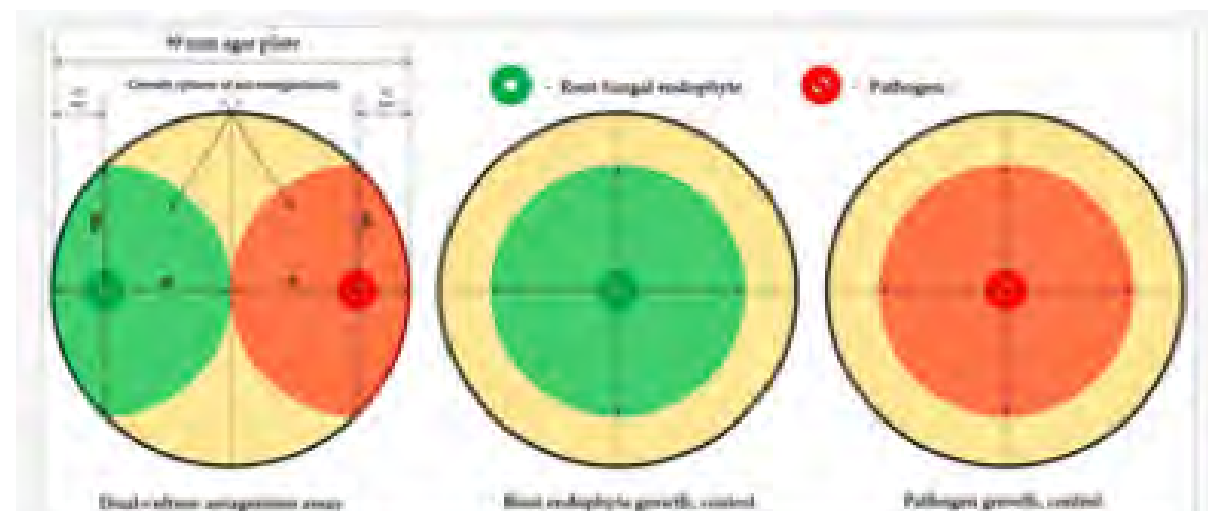
Learning outcomes.

1. Learn how to rear mosquitoes.
2. Distinguish between the male and female sexes of *Aedes aegypti*.
3. Feeding of mosquitoes.
4. Perform behavioral experiments with *Aedes aegypti*.

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GA-Arbete 2020

Carmen Romeralo, Postdoktor, Spanien



Forest Microorganisms: The Good, The Bad and The Ugly

Projektbeskrivning Carmen Romeralo

Titel: Forest Microorganisms: The Good, The Bad and the Ugly

Projektidé:

The Good: Fungal endophytes are microorganisms that live inside the plants and maintain a neutral or beneficial relationship with them. They help plants to grow, to feed and sometimes to “fight” against its enemies, the pathogens.

The Bad: Forest diseases are produced by pathogens, mainly fungi, bacteria and viruses. The diseases are an increasing threat to the ecosystem benefits from forests and they have a huge economic and environmental impact worldwide.

The Ugly: Phytophthora is one type of microorganism that produces damage to beech forests in Southern Sweden. Its infection can produce bleeding cankers in the bark of beech trees.

In our project, the student will do some “dual culture” experiments to see how the good microorganisms (fungal endophytes) can suppress the growth of the bad ones (the pathogens) competing for space and food and thus can be potentially used to fight against forest diseases.

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GA-Arbete 2020

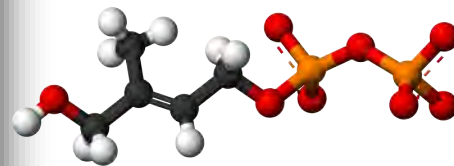
Matthew Lukenge, doktorand, Uganda



Mosquito Feeding Stimulants



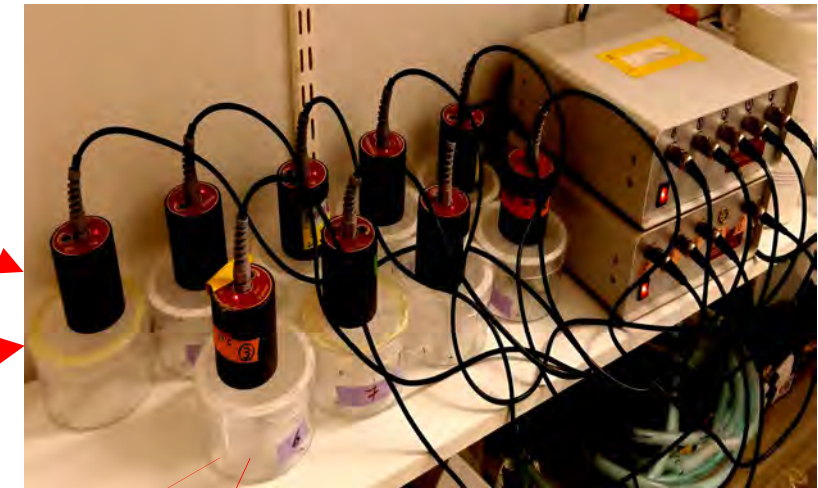
i) Adenosine Triphosphate (ATP)



ii) HMBPP

???

Behavioral Feeding Assay



Unfed & Blue Dye in
ATP-fed mosquitoes

A malaria parasite molecule potentially stimulates feeding in dengue fever mosquitoes

Projektbeskrivning Matthew Lukenge

Titel: A malaria parasite molecule potentially stimulates feeding in dengue fever mosquitoes

Projektidé:

Female mosquitoes need to blood-feed to nourish their eggs. After landing on the preferred blood host, they have to accurately and quickly determine the right spot to pierce, detect the blood vessel but critically, they have to determine whether the blood meal is aversive or acceptable. (E)-4-Hydroxy-3-methyl-but-2-enyl pyrophosphate (HMBPP) is a malaria parasite metabolite that has been reported to stimulate acceptance of human blood feeding in malaria mosquitoes. As part of developing a generalised vector control tool, we shall examine whether the same molecule stimulates the dengue fever vector that also has preference to biting and feeding on human blood. Another prospective feeding stimulant molecule, adenosine triphosphate (ATP) will also be evaluated in this study.

In the pilot study, the student will learn how to:

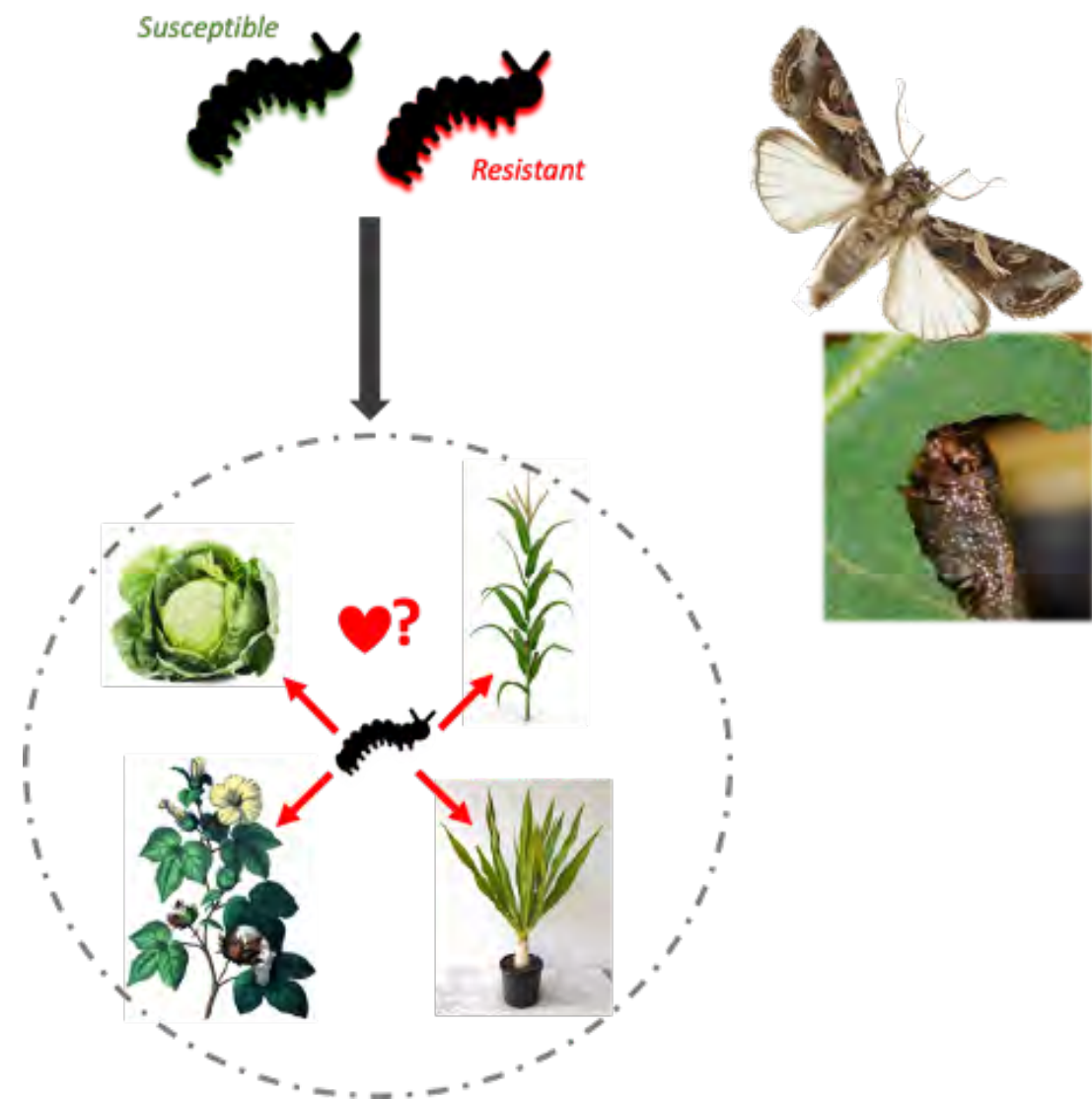
- i) maintain mosquito vectors in the insectary controlled conditions.
- ii) examine for a dose-response of mosquito vector to feeding stimulants (HMBPP & ATP)

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GA-arbete 2020



Audrey Bras, postdoktor, Frankrike



Does insecticide resistance change larval host plant preferences?

Projektbeskrivning Audrey Bras

Titel: Does insecticide resistance change larval host plant preferences?

Projektidé:

The nocturnal moth *Spodoptera littoralis* is an important crop pest. It is able to feed on a large array of plants but have a preference for cotton. Some individuals are selected for insecticide resistance to study its impact on the insect's host plant range. We are trying to determine if the development of insecticide resistance can change larval feeding behavior on several host.

Students will take part of this project by investigating if insecticide resistance developed by the parents can change the larval host plant preferences of their offspring.

- Students will have the possibility to study the choice made by the larvae between 4 host plants including a novel host.
- Students will have the opportunity to compare choices made by larvae susceptible to insecticide and larvae resistant to insecticide.

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GA-arbete 2020



Kristina Karlsson-Green, forskare, Sverige



Reproductive costs of pesticide resistance in the Egyptian cotton leafworm, *Spodoptera littoralis*

Projektbeskrivning Kristina Karlsson Green

Titel: Reproductive costs of pesticide resistance in the Egyptian cotton leafworm, *Spodoptera littoralis*

Projektidé:

Pesticide resistance rapidly evolves in insects when they are exposed to pesticides for several generations. Resistance traits are usually considered to come at a cost, where a decreased reproductive ability may be one potential cost that outweigh the benefits of being resistant. In this project, students are proposed to compare the reproductive behavior between pesticide resistant and pesticide susceptible individuals in the nocturnal moth *Spodoptera littoralis*. Understanding the differences between resistant and susceptible individuals is important to understand pesticide resistance evolution.

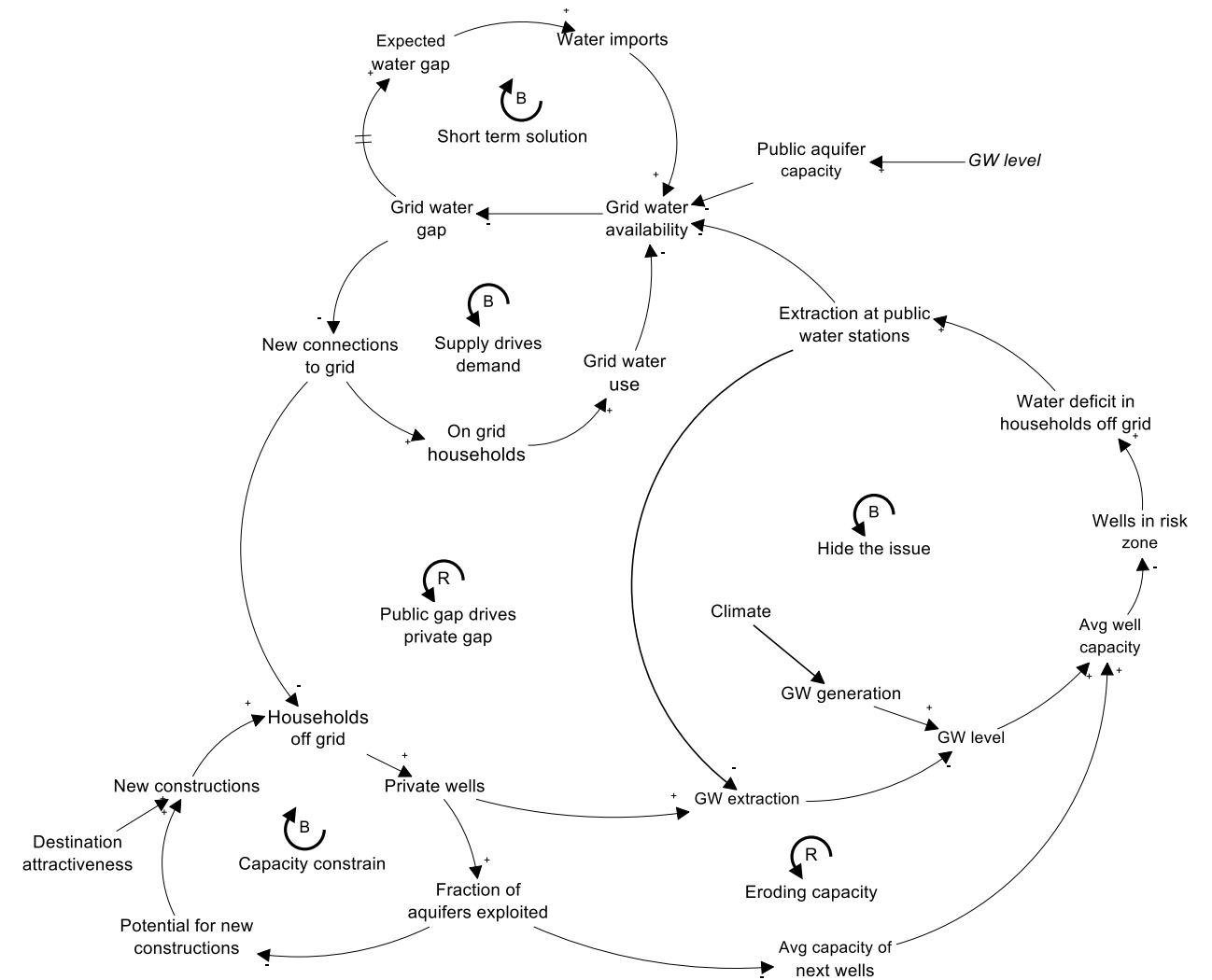
In the experiment, adult moths will be introduced in mating cages and monitored during a day to see when they start mating. Three days later, the egg batches will be collected and weighed to see if the reproductive output differs between the treatment groups.

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GA-arbete 2020



Andreas Nicolaidis Lindqvist, doktorand, Sverige



Modeling decision making in agricultural drought management

Projektbeskrivning Andreas Nicolaidis Lindqvist

Titel: Modeling decision making in agricultural drought management

Projektidé:

Water is a principal resource in agricultural production and without sufficient supply the productivity and robustness of agricultural systems is severely limited. The 2018 drought caused significant yield losses in Swedish crop production and demonstrated how sensitive these systems are to variations in water availability.

In this project the student will combine desktop and interview studies to investigate what drought management strategies were used by farmers on Gotland during the drought in 2018, what decision structures that drove their choice of strategies, and if (and how) the farmers have changed their management strategies post-2018 to be better prepared for future dry years. The students will synthesize the results into a qualitative decision-structure model using the System Dynamics method.

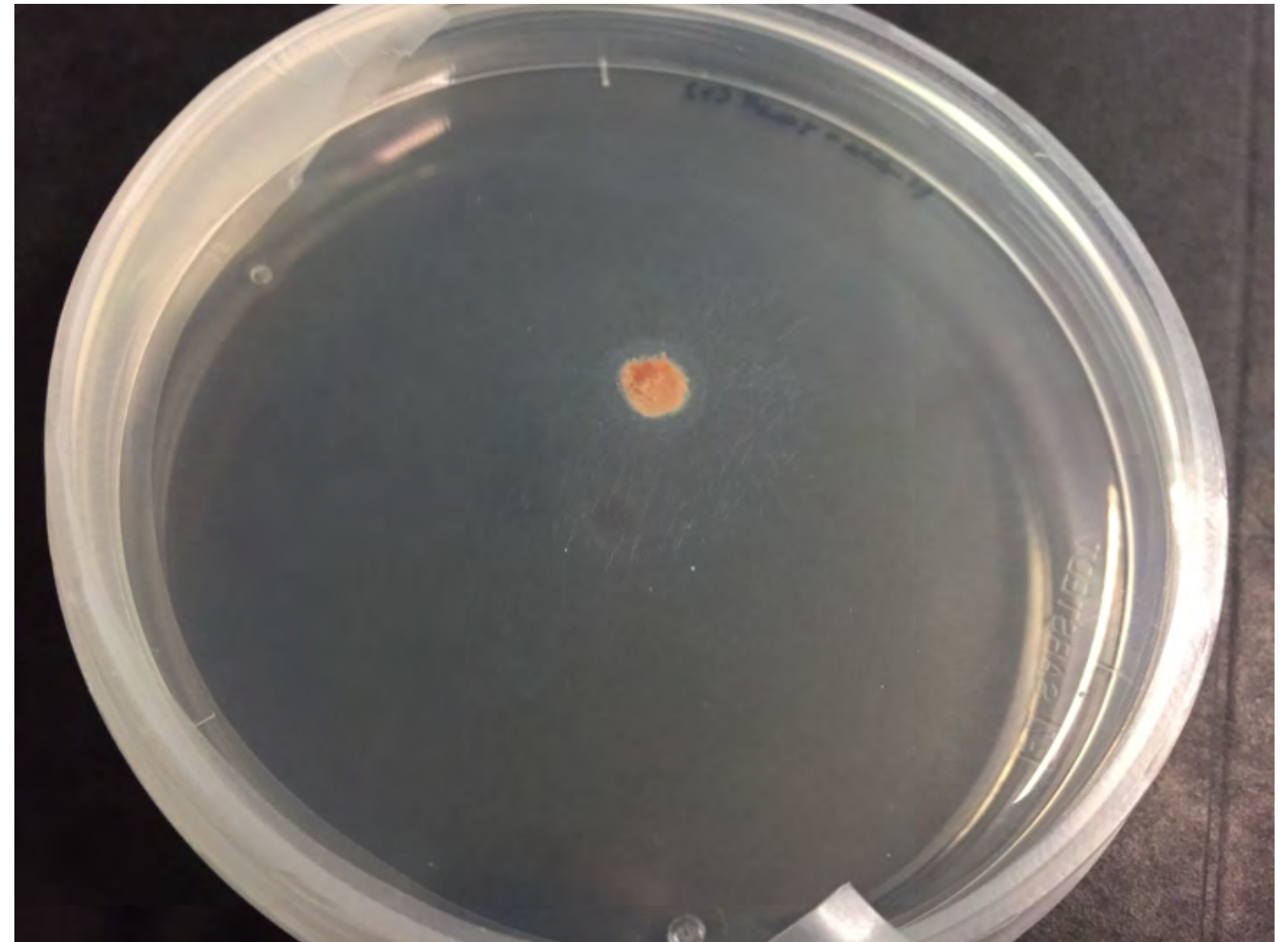
Learning outcomes:

1. Experience in qualitative data collection
2. Learn how to elicit causal-information from qualitative data
3. Learn how to qualitatively model decision making using the System Dynamics

Kontaktuppgifter: andreas.nicolaidis@ri.se

GA-Arbete 2020

Christian Andersen, doktorand, Danmark



Assessment of different growth substrates for the biocontrol agent
Pythium oligandrum

Projektbeskrivning Christian Benjamin Andersen

Titel: Assessment of different growth substrates for the biocontrol agent
Pythium oligandrum

Projektidé:

By the use of Bioinformatic tools and qPCR we have identified several novel genes that are differential expressed during the interaction among the Oomycete species *Phytophthora infestans* and *Pythium oligandrum*. These genes are involved in the breakdown of carbon sources of the preys cell wall and might be involved in prey recognition from the biocontrol agent *Pythium oligandrum*.

In this project we investigate this hypothesis further using different composition of minimal media, which contains the carbon sources that we have identified as important for the mycoparasite *Pythium oligandrum*

The tools we will use in this project will be comprised of molecular biology, microbiology and statistics.

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