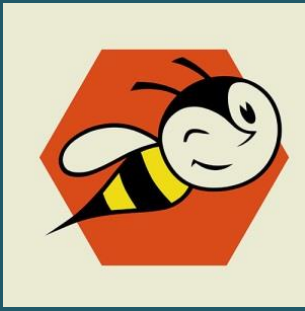




PolliClim

“Sometimes the field season seems to be sent from Hell”

-Dr. Nielsen

A Sporadic Newsletter

Vol 3; September 2015

We have now been through the second field season here in Norway and it's fair to say it did not go very well. On the West coast the raspberry flowering was delayed for several weeks and one of our farms on the East coast got an infection on the plants. It poses some challenges on our work, but this is nothing compared to the monetary losses the Moskvil farm is facing. Sad for us all. However, we have been able to gather a significant amount of data on pollinator activity in relation to temperature and relative air humidity. Congratulations to us all! Two more master students have been taken on the project here in Oslo (Solveig Haug and Arrian Karbassioo). They will work on the pollination of wild raspberry along a climate gradient. More on all this below.

What have we done lately?

The first PolliClim paper (Reitan & Nielsen 2015. “Do not divide count data with count data; a story from pollination ecology with implications beyond”) was submitted to *Methods in Ecology and Evolution*. They rejected it without review. Bad people! However, we quickly resubmitted it to *PloS One* where it is currently in review.

The “well planned” field season of 2015 became a nightmare. Eveliina Kallionemi was hired as field assistant for the full month of June. She was supposed to work on the West coast, but the flowering season was significantly delayed. She therefore came to Vestfold to work at our farm Aarsland on Nøtterøy. She did a tremendous job and indeed saved the season as such. This, because the Moskvil farm, where Andreas did his fieldwork, got an infection in the plants, resulting in heavy die-offs. This gave extremely low flower production and consequently low numbers of flower visitation. The Moskvil farm will not be able to produce

raspberries for the next 15 years, to put our minute troubles in perspective.

To follow up on Adrian's efforts to investigate the effect of UV reflecting paint on pan traps we have initiated a sampling scheme here in Oslo. Four clusters of four traps have been set out several times during the late summer here at the University Campus. It is late in the season and the number of insects caught is limited, but we might get an idea of how important UV reflecting paint is. An important aspect of the sampling protocol is the randomization of UV reflecting and not UV reflecting within each cluster. We expect that we will have to repeat the sampling next spring when the bee populations are bigger (Fig. 1).



Figure 1: Pan trapping for kids. From the left Leonora, Linnéa and Elliot, the two latter my own contribution to the gene pool.

In addition to the sampling of flower visits in relation to temperature and humidity we conducted a full day of parallel (four people simultaneously) sampling to investigate at what spatial scale the random variation in flower visits were most prominent. The rationale for doing this was that we wanted to know how to best sample one single farm, not missing out on within-farm variation in flower visits. To get a good idea of how the flowers are visited within a farm should we: Distribute

our sampling throughout the entire farm? Would it be OK if we sample adjacent plants in one single area of the farm? Or, would it be enough to sample a lot of flowers within a single plant? If the latter was the case we could save valuable time moving around to different study plots, taking several environmental measures and do a lot of counting of flowers and other variables. Our preliminary analyses tells us that the variation occur among single flowers, not throughout the field, in our particular system. This might not be the case in larger more intense agricultural settings, but doing an assessment of this can be useful anyway. A paper is in preparation and Trond will present the idea at the Annual Meeting of the Scandinavian Pollination Ecologists (SCAPE).

Based on two years of fieldwork we have realized that the extent of the climate gradients observed in Norwegian commercial raspberry production are very limited. It is therefore difficult to assess the effect of environmental variables, as they do not vary that much. It has therefore been decided to take on two new master students to be working on wild raspberry. In Norway wild raspberry grows from the coast all the way to the mountainous forest line, in other words along a climate gradient with significant extent.

Networking/visitors

Through his involvement in the COST Action SUPER-B Dr. Nielsen had a visit by Mike Garratt from the University of Reading. It has become a very fruitful *[sic]* collaboration and the idea is for Dr. Nielsen to travel to England next year to conduct some comparable fieldwork. Indeed the SUPER-B involvement has made the PolliClim project internationally renowned. It therefore did not come as a surprise that Dr. Nielsen was invited to participate at an event entitled “Pathways to Global Pollinator Partnerships” held at the UK pavilion at the Milan Expo on July 13th (Fig. 2). There was, however, a bit of a surprise that they asked me to pay the entire trip myself. Thanks to CEES and the RCN for their support.

The annual meeting of the Management committee in SUPER-B will be held in Malta, but Dr. Nielsen will, unfortunately, not attend as he is speaking at a conference held by the research Council of Norway, and they do pay his salary!



Johann Kiefer, a master student from Paris came for a two months visit this spring. He is working on a master in ecotoxicology and collaborated with Julie on her project on behavioural effects of neonicotinoids in bumble bees. He did a good job sorting out a lot of practical issues, including bumble bee handling and calculations of pesticide dosages to be used. In addition he was a nice and social guy. Good luck with your future studies Johann.

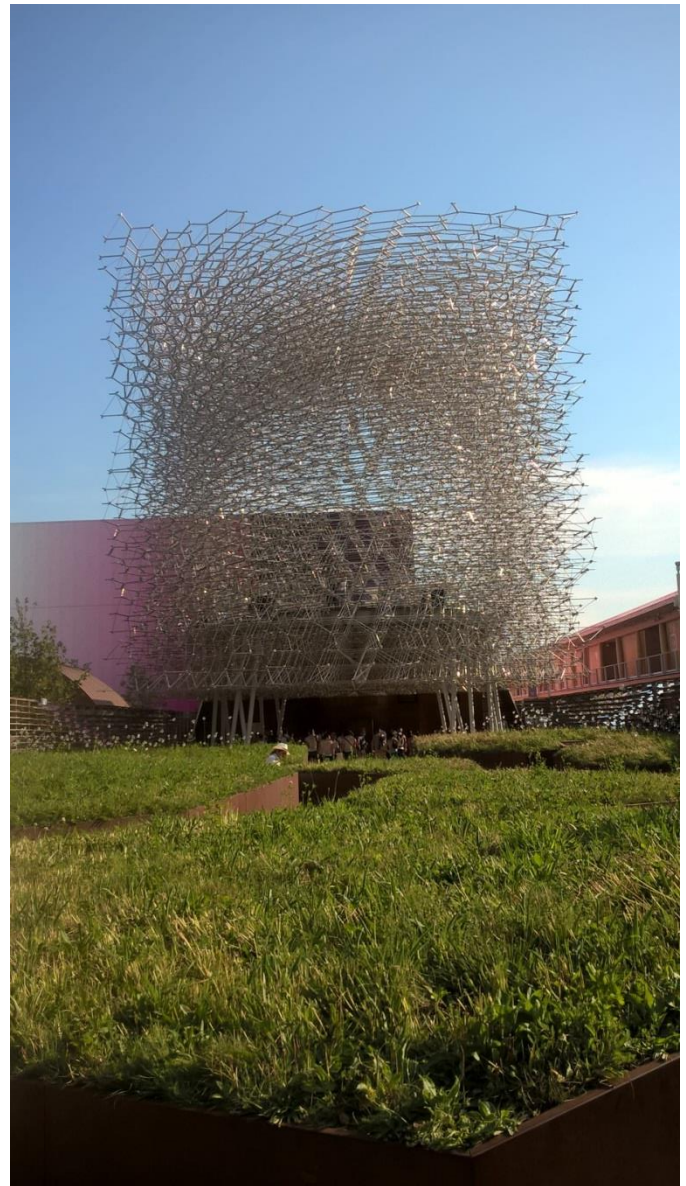


Figure 2: The UK pavilion at the Milan EXPO2015. The entire stand is centred on bees and numerous events, and the pavilion itself, highlight the importance of bees and pollinators. The artist Wolfgang Buttress, designing the whole thing, is a pretty cool guy.



Work in progress

Dr. Nielsen and Stein Joar Hegland have been working on a manuscript based on last year's field work on flower visits to raspberry. Trond has conducted the statistical analyses and generated some predictions related to the different environmental variables recorded. Our main conclusion is that we did not sample enough last year; in particular the environmental gradients are too narrow, giving our predictions enormous confidence intervals towards the end of the gradients. As Stein Joar is now Dean of the Faculty of Engineering and Technology at Sogn and Fjordane University College our close scientific collaboration is temporarily on hold. We will continue working on the data sampled on the West coast in 2014, but as a part of the larger data set spanning two field seasons and two geographic regions.

Collaboration with the industry

During the field season we interact extensively with the farmers whose raspberry fields we work in. Closer ties have been built and it is indeed a pity we will not be able to work with the people at Moskvil no more.

Master students

The "Dr. Nielsen I presume group" is constantly expanding and there are currently six master students associated with the PolliClim project. In addition **Megan Hoff** is applying for Fulbright scholarship again, so she might join us next year.

Julie Paus-Knudsen is gone for a year as she was elected president for the Student Organisation here at the University of Oslo and she is now a full time politician for a year. Before she left she managed, in collaboration with Johann Kieffer, to sort out most practical issues regarding the experimental setup.

Andreas Westgård Rinnvoll conducted his field season this summer and is now in the initial phase of digging into the data analyses. In the months to come he will analyse the available data and start writing up his thesis.

Helge Lone had a rough spring and did not manage to submit his thesis as planned. His economic assessment of pollination in a Norwegian agricultural setting would be a nice contribution to the PolliClim project, so hopefully we will see him back again at some point.

Ingvild Fonn Asmervik has joined the PolliClim team and is currently developing her project plan together with Mariano. She helped us out with some fieldwork here in Norway this summer but the bulk of work is still to come when she travels down to Argentina in December. She will use a latitudinal gradient spanning 200km to look for

differences in soy bean pollination that can be related to climate variables.

Solveig Haug and **Arrian Karbassioo**n have also just been enrolled as master students on the PolliClim project. They will observe plant-pollinator interactions along an elevation gradient ranging from sea level to ~800masl. The rationale for is to get a better understanding of how climate variation affects plant-pollinator interactions, using wild raspberry as the focal species. Arrian will concentrate on pollination of raspberry while Solveig will focus on the entire plant community, using the abundance of a dominant species, raspberry, as an explanatory variable.

Outreach/dissemination/presentations/publications

We have not progressed as we hoped when it comes to scientific publications. This will improve. The paper by Reitan & Nielsen "Do not divide count data with count data; a story from pollination ecology with implications beyond" is currently in review in PlossOne and the spatial scale study is in progress. The paper on raspberry pollination in Norway has been on hold for a while, but the plan is to get it going this fall.

We have published a short story in the magazine "Gartneryrket", a publication aimed at gardeners and fruit and berry producers. The Editor was eager to hear more from us so we plan to do another one when we have some more substantial results. This could be a job including Andreas and his analyses of the visitation data to raspberries this summer.

Dr. Nielsen himself visited Cold Spring Harbor in May, presenting a poster at the "Genomics of Social Insects" conference. This is a side project, but still relevant for pollination. On September 1th I also gave a talk entitled "Biodiversity in Agriculture – Pollinating Insects" for Oikos Norway, the association for Ecological farming. In October I will give a talk at a seminar held by The Norwegian Environment Agency on "Global Threats to Pollinators".

Trond and **Andreas** will present their work at the Annual Meeting of the Scandinavian Pollination Ecologists (SCAPE), while the entire Oslo part of the team will give presentations at the Annual CEES Student Conference in October.

Take care
Anders