Master- and Bachelor Thesis Topics 2019-2020
Master-/bachelor-oppgaver

Plant protection
Plantevernfag

Her er mange forslag til spennende oppgaver innen plantevernfag, d.v.s. ugras/herbologi, plantepatologi, landbruksentomologi og pesticidkjemi. Dersom du vil finne ut mer om oppgavene ta kontakt med veilederen(e) som er oppført, med kopi til faggruppelederen i Plantevern og Matplanter siv.remberg@nmbu.no. Du kan også komme med eget forslag til oppgaver.

Below you will find many interesting thesis topics in plant protection, including weed science, plant pathology, agricultural entomology and pesticide science. If you want to know more about a topic, contact the supervisor listed for the topic, and copy to the head of section siv.remberg@nmbu.no. You can also suggest a topic that is not listed here.

Agricultural entomology
Landbruksentomologi

28	**Can UV suppress pests and be used together with biocontrol agents?**

Supervisor: Nina Svae Johansen, NIBIO/NMBU. nina.johansen@nibio.no

Background: Treatment of plants with low doses of UV in a few minutes during the night has potential to reduce problems with some pests, e.g. the two spotted spider mite and aphids, without harming the plants. Using UV to suppress pest population growth in combination with biological control would be a good solution for a pesticide free plant protection, but we need to know more about how UV affect the biology of both pests and biological control agents and their interactions.

Suggested model organisms:

- Pests: Two-spotted spider mite, aphids or whiteflies
- Biocontrol agents: Predatory mites, predatory bugs or parasitoids.

Fig. 2 *Adult and egg of two-spotted spider mite (Photo: K. Westrum, NIBIO)*

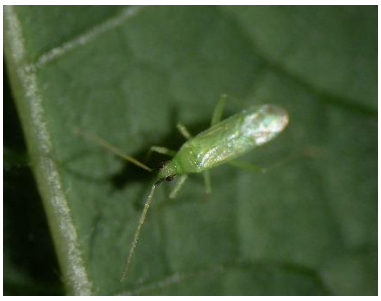

Fig. 3 *The predatory bug Macrolophus is used against spider mites and whiteflies (Photo: E. Fløistad, NIBIO)*

Fig. 4 *Parasitoids and parasitized aphids (Photo: E. Fløistad, NIBIO).*

Examples of research questions could be:

- To what degree will the UV affect survival, development, reproduction and behaviour of the pest insect/mite?
- To what degree will UV affect the biocontrol agent's survival, development, reproduction and behaviour (e.g. searching efficiency and parasitism/predation rate)?
- Pests and biocontrol agents may respond differently on the UV-treatment. Will this influence the balance between the pest and biocontrol agent population development and the success of the biological control?

Time for doing experiments: All year round, depending on type of study

Type of studies (you can chose between alternatives): Basic studies of biology and behaviour of pests and biocontrol agents in laboratory and/or research greenhouses, and/or studies of population development and biological control in a selected greenhouse or field crop.

29	**Insecticide resistance monitoring and management**

Supervisor: Nina Svae Johansen, NIBIO/NMBU. nina.johansen@nibio.no

Background: Pesticide has become an increasing problem in Norwegian agriculture. Insect and mite pests of concern are the e.g. pollen beetles (*Brassicogethes/ Meligethes* spp.) and flea beetles in oilseed crops, diamondback moth (*Plutella xylostella*) in cruciferous crops and two-spotted spider mite (*Tetranychus urticae*) in soft fruits berry production. Some populations of these pests have developed resistance towards one or more pesticides. In order to obtain less and a more sustainable use of insecticides, and reduce the risk of resistance development, there is a need to develop resistance management strategies for use at farm and district level, and to include anti-resistance strategies in integrated pest management programs.

Fig. 1. *Adult and egg of two-spotted spider mite (Photo: K. Westrum, NIBIO)*

Fig. 2*. Adult pollen beetles on spring rape flower buds. (Photo: E. Fløistad, NIBIO)*

Fig. 3 *Larvae of diamondback moth (Photo: E. Fløistad, NIBIO).*

Thesis: Different approaches are relevant, and a specific approach must be made based on the student's field of interests. The master thesis will be a part of the projects Pesticide resistance: Mutation, selection and dispersal (RESISTOPP) 2017-2021 or Pesticide resistance: Preparedness and anti-resistance strategies (2017-2019).

Examples of topics are:

- Monitoring the susceptibility in one of the mentioned pests towards insecticides used for their control. The work will include collection of pests from field, resistance tests (bioassays) in laboratory and/or efficacy experiments in fields.
- Effect of the composition of the pollen beetle species-complex on resistance level: The work will include identification of pollen beetles collected from oilseed rape fields with morphological or molecular methods (beetles collected in 2016-2018 are available as well) and resistance tests (historical and/ or new data).
- Effect of resistance development on the fitness of two-spotted spider mites. The work will include resistance selection in a strain of the two spotted spider mites, and experiments to study of how resistance affects the biology of the mites. Laboratory experiments.
- Development of anti-resistance strategies for pest control in one of the crops for use at farm and district level: The work will include literature study, compilation of current knowledge on resistance management and interviews with agricultural advisors and farmers, and can be combined with one of the above-mentioned tasks.

You will get help with the handling of insecticides.

Time for doing different tasks: Field collection of pests during May-August; resistance testing with bioassays during May-December; fitness-resistance studies in laboratory and development of and anti-resistance strategies during January-December.

Read more (in Norwegian):

Johansen NS, Asalf B, Eikemo H, Ficke A, Herrero M, Le VH, Netland J, Ringselle B, Schjøll AF, Stensvand A, Strømeng GM (2017). Plantevernmiddelresistens hos skadegjørere i norske jord- og hagebrukskulturer. NIBIO Rapport 3 (150) 2017. 60 pp. https://brage.bibsys.no/xmlui/handle/11250/2481104

Pollen beetles: https://www.plantevernleksikonet.no/l/oppslag/73/

Diamondback moth: https://www.plantevernleksikonet.no/l/oppslag/93/

Two spotted spider mites: https://www.plantevernleksikonet.no/l/oppslag/19/

30	**Biological control of the new thrips *Thrips setosus* in protected crops**

Supervisor: Nina Svae Johansen, NIBIO/NMBU. nina.johansen@nibio.no

Background: A new thrips (*Thrips setosus*) from Asia, has spread very rapidly in European countries during the last 3 years. As this thrips can cause considerable damage in several crops, it has been of concern to the European Plant Protection Organization (EPPO). In 2018, *T. setosus* was introduced to Norwegian greenhouses on imported plants. Currently, this thrips can only be controlled by insecticides. This is a problem for growers who use biological control as their main control strategy. Predatory mites, predatory bugs and nematodes are approved and used for biological control against thrips in Norway, but we do not know if they are able to control *T. setosus*.

Fig. 1. *Adult Thrips setosus.*

Fig. 2. *Thrips setosus on the underside of a leaf and thrips damage on petals.*

Thesis: Investigate if any of the approved natural enemies can be used for biological control of the new thrips *T. setosus*. According to the student's fields of interest, the work can include predation/infection studies of one or two selected natural enemies in laboratory experiments or in controlled climate chambers. It might be possible to do biological control experiments in a commercial greenhouse if a grower are willing to act as a host (this might imply travelling to the greenhouse).

The student should take contact early, because we need to establish a culture of *T. setosus* well in advance before the experiments can start.

Read about Thrips setosus:

In Norwegian: https://www.plantevernleksikonet.no/l/oppslag/1882/

In English: https://gd.eppo.int/taxon/THRISE

31	**Management of the alien invasive horse-chestnut leafminer *Cameraria ohridella***

Supervisor: Nina Svae Johansen, NIBIO/NMBU. nina.johansen@nibio.no

Background: The horse-chestnut leafminer (*Cameraria ohridella*) was first described in Macedonia in 1984, it then spread rapidly accross Europe. The larvae, mining in the leaves, has caused considerable damage on horse-chestnut threes since the 1980'es. The horse-chestnut leaf miner was found for the first time in Drøbak in Norway in 2013, and has so far been found at several locations around Oslofjorden, including in the park at NMBU, and at one location in Vest-Agder. There are little experience on the biology and ecology of this pest in Norway, and how this pest can be managed.

Fig. 1. *Adult horse-chestnut leaf miner*

Fig. 2. *Leaf mines made by larvae of horse-chestnut leaf miner*

Thesis: Different approaches are relevant, and a specific approach must be made based on the student's field of interests.

Examples of topics are:

- Investigate current distribution of the horse-chestnut leafminer in Norway.
- At selected location(s):
    - Phenology of the horse-chestnut leafminer
    - Survey of natural enemies of the horse-chestnut leafminer at selected locations
    - Investigate winter survival of the horse-chestnut leafminer at selected locations
- Develop a guideline for prevention and management of horse-chestnut leafminer on trees in urban areas.

Read more about the horse-chestnut leafminer:

In Norwegian: https://www.plantevernleksikonet.no/l/oppslag/1850/

In English: https://gd.eppo.int/taxon/LITHOD