SICAMM 2018 conference

Mustiala, Finland

13.–15.7.2018

Organized by the Finnish Beekeepers' Association at HAMK, Häme University of Applied Sciences

SICAMM is the international association for the protection of the European dark bee

Welcome to the dark side! The SICAMM 2018 dark bee conference in Finland
This time we have the congress in the middle of the summer instead of autumn. We want to show You Finnish beekeeping, a dark bee mating yard in the archipelago, sauna by the lake and light Northern summer nights. In mid-July, between the hard work at the beginning of the season, honey harvesting and preparing the colonies for the winter, there is a while for the Finnish beekeeper to take a breath as well. We hope that You find interesting talks and enjoy your visit to Finland!
Lassi Kauko, President, Finnish Association of the Dark Bee Keepers

SICAMM 2018 CONFERENCE PROGRAM:
Friday 13th July
9:00 Opening ceremony
10:00 Keynote speaker Bjørn Dahle, Norway: SMARTBEES – Sustainable management of resilient bee populations
10:45 Coffee break
11:05 Per Thunman: *SICAMM today and tomorrow*
11:25 Lassi Kauko: *Dark bees in Finland*
11:45 Lars Kirkerud: *Brown bees A. m. mellifera in Norway – present situtation*
12:05 Joseph Widdicombe: *Developing a 'strain' from a hybridised population*
12:25 Ralf Ulrich: *Current activities in the German association for breeding Apis mellifera mellifera*
12:45 Annika Michelson: *Dark bees in Estonia*
13:05 Lunch
14:00 Ingvar Arvidsson: *Dark bees in Sweden*
14:20 Beata Panasiuk: *Conservation programs of Apis mellifera mellifera bees in Poland*
14:40 Beata Madras-Majewska, Łucja Skonieczna: *Variability of morphological features of the native middle-European bee*
15:00 Dylan Elen: *The dark bee movement in North-Belgium - an update*
15:20 Coffee break
16:00 Melanie Parejo: *Honeybee conservation genomics in Switzerland and informative SNPs to estimating C-lineage introgression in A. m. mellifera*
16:20 Norman Carreck: *Where are we heading with local bees in Britain and Ireland?*
18:00 Smoke sauna and social event at Korteniemi traditional farm

Saturday 14th July
9:00 Keynote speaker Ralph Büchler, Germany: *Honey bee mating behavior drives selection on local adaptation and disease resistance*
9:45 Dorian Pritchard: *Geordie bees bite the mite*
10:00 Nils Jakob Drivdal: *Diversity – a challenge for dark bee projects*
10:20 Coffee break
10:40 Roger Patterson: *Sustainability - can we all work together?*
11:20 Małgorzata Bieńkowska: *Bee breeding activity in Poland*
11:40 Lauri Ruottinen: *Mustiala – history and education*
12:00 Risto Kuittinen: *How a measuring system can help the management of honey bee colonies*
12:20 Aimo Nurminen: *Branding the honey of dark bees*
12:40 Ole Hertz: *A report from the Greenland beekeeping project*
13:00 Lunch
14:00 Alice Pinto: *A novel SNP-based tool for estimating C-lineage introgression in the dark honey bee* 4
14:20 Maritta Martikkala: *Beekeeping in Finland*
14:40 Marleen Boerjan: *Natural selection of varroa tolerant Apis mellifera mellifera 'black bee' colonies in the Netherlands*
15:00 Dylan Elen: *Breeding for conservation - a new European initiative*
15:20 Coffee break
16:10 Jack Hassett: *Significant pure population of the dark European honey bee (Apis mellifera mellifera) remains in Ireland*
16:30 Keith Browne: *Investigations into wild black bees in Ireland*
18:00 Dinner with a historical theme

Sunday 15th July
9:00 Keynote speaker Per Kryger, Denmark: *Bee races in Europe, their genetic characteristics and relationships*
9:45 Padruot Fried: *The project to protect the dark bee in Switzerland, 2015-17*
10:05 Jonathan Ellis: *Introgression in native populations of Apis mellifera mellifera L in the UK: implications for conservation*
10:30 Coffee break
10:50 Jacques van Alphen: *Is natural selection alone enough for the evolution of resistance against varroa in the European honeybee?*
11:10 Anneli Salonen: *Are there* d*ifferences in honey collected by Italian and dark honey bees?*
11:30 Jussi Marin: *Goal, it´s honey!*
11:40 Helen Mooney: *SICAMM 2020 congress in Ireland*
12:00 SICAMM meeting
13:00 Lunch

Monday 16th July
Excursion: Dark bee breeding magic in the sunny archipelago
Pakinainen island has had a pure breeding operation of the dark bee since year 2000. In addition to the bees, we will take a look at the rich flora of the island.

Tuesday 17th July
Excursion: Presidential bees and flowers, Naantali old town and something sparkling
Our main attraction is the Kultaranta, which has been the summer residence of Finnish presidents since 1922. Dark bees have been kept here for 10+ years. Our second attraction is Naantali Old Town. We will also visit the Naantali Abbey and our last stop will be the Brinkhall Sparkling Factory & Shop.

Wednesday 18th July
Open house at Hunajayhtymä, the largest honey packer in Finland 5

SMARTBEES – Sustainable managament of resilient bee populations
Dahle, B.
Norwegian Beekeepers Association, Norway; e-mail: bjorn.dahle@norbi.no
SmartBees is a collaborative research project between 16 partners from universities, research institutions and companies across Europe. With funding from the European Union seventh framework programme, we are working on solutions to prevent colony losses caused by the Varroa mite and viruses and to counteract the systematic replacement of many native European bees with only two specific races which is observed over the last years. The team encompasses geneticists, molecular biologists, parasitologists, virologists, immunologists, communication specialists, mathematicians, and bee specialists. Some main results from the project will be presented.

SICAMM today and tomorrow
Thunman, P.
Vice president of SICAMM and beekeeper, Sweden; e-mail: pgthunman@hotmail.com
SICAMM was founded in 1995 at Flekkefjord, Norway by beekeepers and scientists from Austria, Denmark, Germany, Norway, Poland, Sweden, Switzerland and the United Kingdom, as an international association devoted to the protection of the European dark honeybee, *Apis mellifera mellifera*. The first president was Josef Stark from Sweden. After his death in 2004 Dorian Pritchard became the president. One of the objectives is to promote national and international cooperation between beekeepers, scientists, associations and institutions concerned with conservation of the dark north European honeybee *Apis mellifera mellifera*, L. One way of reaching the objectives is to organize conferences every second year. It is today a very informal organisation, no member fee and it is not registered in any country. Members are from nearly the whole Europe. All members of the board work voluntary. After this conference in Finland there will be a suggestion of how to formalize the organisation.

Dark bees in Finland
Kauko, L.
Finnish association of the dark bee keepers, Finland; e-mail: lkauko@netti.fi
Finland is outside the natural range of the honey bees, the bees can not survive here without management. Beekeeping started in eighteenth century with introduction of dark bees from Sweden to south western Finland after several attempts.
Other bee races were imported in the beginning of twentieth century but dark bees were predominant until sixties, when especially ligustica but even some others like caucasian queens were brought in big amounts. The breeding of italian queens was becoming quite extensive and to the end of 20th century pure melllifera bees were vanished almost totally. The project in northern Finland succeeded to find one pure enough strain kept by beekeeper Väinö Mäki. In next years the Mäki strain was maintained by artificial insemination at breeding station of beekeepers' association.
Next step was when swedish Nordbi people visited project run in south western islands and made people there interested in dark bees. One of members of the group, Aimo Nurminen, started breeding bees on an island mating yard. The size of Mäki population made necessary in order to avoid inbreeding to introduce material from Sweden.
Now there are 300–400 dark bee colonies kept by about 30 beekeepers and one queen breeder with mating yard on an island in south western Finland. Another breeder will start this summer, he will have his mating yard on another island in southern Finland

Brown bees A. m. mellifera in Norway – present situtation
Kirkerud, L.A.

Norsk Brunbielag, Norway; e-mail: lkirkerd@online.no
Like the rest of the world, our original stock of brown bees has been depressed by importation and hybridisation of bees from abroad. There are now only about 10 percent of Norwegian bees that are considered by their keepers to be brown bees. Of these, another 10 % may have the purity and properties worth breeding on.
Brown bees in Norway seem to belong to two different stocks. One probably connects to populations in Sweden, the Baltic countries and Russia. These "forest bees" are now kept mainly in the eastern part, especially Hedmark county. The other stems from early import from the heathen of western Germany. These "heather bees" are to be found in the southern and western part of the country. They have got their reservation area in four municipalities in the south, around Flekkefjord.
The forest bees cannot be distinguished morphologically from heather bees. Their moods and behaviour, however, may be somewhat different.
Norwegian brown bees have been subject to breeding by different actors during the last century. The Norwegian Beekeepers Association has played a major part. Nevertheless, the stock of brown bees in Norway has decreased markedly over the last decades. During the years 2014–2017, the newly created "Norsk Brunbielag" or "Norwegian Association for Conservation and Breeding of Apis mellifera mellifera", NOCAMM, got foundation from The Norwegian Agriculture Agency to map the populations around the country, investigate their purity and promote breeding and use. The results, so far, are presented.

Developing a 'strain' from a hybridised population
Widdicombe, J.
President of BIBBA (Bee Improvement and Bee Breeders Association) and author, UK; e-mail: jowid@idnet.com
I will talk about the bees I started with and how I have been able to develop a near-native strain from them. I run 100–150 colonies in the area.

Dark bees in Estonia
Michelson, A.
HAMK University of Applied Sciences, Finland; e-mail: annika.michelson@hamk.fi
In 1930-ies F. Linnus mapped old bee trees in Estonia. They had a concentration in south-eastern Estonia but they reached through Estonia up to Virumaa region. There has not been done any investigations on dark bees in Estonia during the Soviet Union period nor during the re-independent time from 1990 to 2018. During the last 20 years I have been involved in making inventories of native breeds in Estonia and kept an eye on dark bees as well. Bees manage to survive winter time by themselves in Estonia. It is not rare to see bark bees in the nature or living in abandoned buildings or old hollow trees.
Several old bee keepers knows dark bees and have experience about them. In 2006 I got a message that there are at least 20 dark bee families left in Estonia. They collect a lot of honey in the Estonian environment, and never leave you without a yield. It is nearly impossible to keep them in beehives as they fligh out and away as well as expand outside the beehives. If one manage to expand their hives so that they get the needed space they are not impossible to keep. There are many old bee keepers that prefer dark bees as they go out and collect honey in remote places and can protect themselves agains bears. Those who are used to dark bees have no problems with keeping them. It uses all possibilities for collecting honey. They have good winter survivar skills and are very patient.

Conservation programs of *Apis mellifera melliefra* bees in Poland
Panasiuk, B., Bieńkowska, M., Naruszewicz, W., Gerula, D. & Węgrzynowicz, P.
Research Institute of Horticulture, Apiculture Division in Puławy, Poland; e-mail: beata.panasiuk@inhort.pl
Central European honey bee, *Apis mellifera mellifera* is an indigenous species inhabiting Western, Central and Northern Europe, from the north-western Alps and the Sudety Mountains to the Ural Mountains. In Poland, this bee was originally found throughout the country except for the southern part of Karpaty. In recent decades, the introduction of other bee subspecies has significantly reduced both the number of colonies with *A. m. mellifera* bees and the area that they are kept. Despite many beneficial features, especially greater resistance to diseases, better overwintering and the ability to use weak forage, Central European bees have been replaced by other subspecies, which is associated with their lower productivity and greater defensive behavior.
Currently, there are four lines of *A. m. mellifera* bees located in the north-eastern and central part of Poland: M Augustowska, M Kampinoska, M Północna and M Asta. These bees are under national programs for the protection of genetic resources in order to preserve the genotype of native bees.
Conservation breeding programs for Central European bees started in Poland in the 70s of the last century. The aim of these programs is to preserve populations by increasing the number of colonies with phenotypic traits that are typical for the line, preserving typical biological and production features (early spring development, resistance to diseases, good wintering, ability to store big amounts of pollen/bee bread, higher defensive behavior, high wax production) and reintroduction of bee queens to the apiaries in the region with only little improvement.
Conservation breeding is based on a system of leading herds – there is a leading herd for each bee line; the main objectives of leading herd are rearing and insemination of bee queens, assessment of bees' value, selection, but also promotion. Apart from the leading herds, there are also cooperating apiaries where beekeepers keep colonies in the required number for each population, transfer bee queens to the herd, assess colonies and provide breeding material if required (larvae and drones).
The number of bee colonies under conservation programs for each line in leading herds and cooperating apiaries in 2017 was: M Augustowska- 246, M Kampinoska- 94, M Północna- 230 and M Asta- 180. However the most important is protection of natural population of native bees and the number of colonies in these apiaries is: M Augustowska 785, M Kampinoska- 300 and M Asta- 550.

Variability of morphplogical features of the native middle-European bee
Madras-Majewska, B. & Skonieczna, Ł.

Apiculture Division, Faculty of Animal Sciences, Warsaw University of Life Sciences, Poland; e-mail: l.skonieczna@wp.pl
The aim of the study was to evaluate the variability of morphological features of three protected lines of native middle-European bee (*Apis mellifera mellifera)* in Poland over 10 consecutive years. The morphological features of native bees indicating on breed affiliation (tongue length, cubital index), determining the size of the bee body (width of the 4th tergite and the sum of the 3rd and 4th tergite) and wings (their length and width), and their correlations have been estimated. The evaluation of the cubital index, the width of 4th tergite and the length of the bee's tongue were also carried out with valid standards of *Apis mellifera mellifera*. Affiliation for Augustowska, Kampinoska and Północna lines to the population of native middle-European bee has been confirmed.
Statistically significant influence of *Apis mellifera mellifera* bee lines on the morphological features were found. Protected lines have demonstrated compliance with the applicable standards for native middle-European bee, and the variability of features has not been narrowed. In addition, it was found that apiary significantly influenced the bee size measured by both width of the 4th tergite and the sum of the widths of the 3rd and 4th tergite and the wing parameters (length and width) in Augustowska, Kampinoska and Północna lines. On the other hand, the comparison of the size of bees measured by the width of the 4th tergite of abdomen in our own research and from those originating from the 1960s from Poland indicates the tendency to dwarf the *Apis mellifera mellifera*.

The dark bee movement in North-Belgium, an update
Elen, D.
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In 2015 the association "Limburgse Zwarte Bij" was founded in the Northeast of Belgium. Some beekeepers over there just wanted to keep AMM again. In the meantime, the association changed its name to "ZwarteBij.org" and has members of the whole of Flanders and the Netherlands. They started breeding activities, they started a mating station, ... A lot of things happened in just 3 years, so time for an update.

Honeybee conservation genomics in Switzerland and informative SNPs to estimating C-lineage introgression in *A. m. mellifera*
Parejo, M.
Agroscope, Swiss Bee Research Centre, Bern, Switzerland / Lab. Genetics, University of the Basque Country (UPV/EHU), Leioa, Spain; e-mail: melanieparejo@gmail.com
In Switzerland, the genetic identity of the native honey bee subspecies, *Apis mellifera mellifera*, is threatened by introgression from introduced conspecifics, mostly *A. m. carnica* and Buckfast bees. To limit hybridization, different conservation efforts have been initiated and protected areas have been established. In this study, we aim to characterize the current honey bee population structure in Switzerland (and the neighboring French Alps), assess genetic diversity and admixture between different populations and to test whether a limited number of informative single nucleotide polymorphisms (SNPs) is able to accurately estimate admixture between native and introduced honeybee subspecies.
For this purpose, we sequenced whole genomes of haploid drones sampled throughout Switzerland (N=120, including 39 from 4 conservation areas) and France (N=31 from a conservatory in Savoy). Thereafter, we used model-based and network-based clustering to estimate individual ancestries and to infer fine-scale population structures.
In total we identified more than 3.374 M high-quality SNPs in our whole-genome sequence data. Based on network topology and admixture results, *A. m. mellifera* samples were clearly separated from other subspecies and clustered according to their geographical origin (Switzerland or France). Furthermore, we detected some highly admixed individuals in the conservation areas suggesting that the conservation management is still not able to entirely purge all foreign alleles and calling for improved efforts. Nonetheless, the major part of the native *A. m. mellifera* population in Switzerland was found to be genetically pure and diverse. Finally, we validated the accuracy of a recently developed SNP panel (including 117 SNPs) to estimate C-lineage introgression in *A. m. mellifera* against whole-genome sequence information. The SNP assay provided highly accurate admixture estimates and was subsequently compared to ancestries inferred from microsatellites currently employed in Switzerland. Furthermore, we report discrepancies between microsatellite- and SNP-based admixture proportions, which require further investigation. In conclusion, the proposed SNP panel can be applied in Switzerland as a precise and cost-effective tool to effectively monitor and manage *A. m. mellifera* conservatories and for selective breeding strategies.

Where are we heading with local bees in Britain and Ireland?
Carreck, N.L.
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Britain and Ireland have never had a well-established queen rearing industry, so most honey bee colonies are headed by queens of unknown origin, but this has allowed near-native bees to remain in many areas of the country. Nevertheless, a number of firms sell imported queens and a number of beekeepers champion their use. The views of a number of professional conservationists and ecologists who claim that the honey bee is alien to Britain, that honey bees have only a minor role in pollination, and compete with “wild” bees, have also been very unhelpful. A number of recent papers have, however, drawn attention to the possible disease risks associated with imported bees. The governments’ National Pollinator Strategies cover all species of insect pollinator, but may provide opportunities for promoting the conservation of honey bees. The results of the COLOSS honey bee Genotype-Environmental Interactions experiment, which showed that locally adapted strains of bee consistently tend to perform better than imported strains, provide support for the use of local bees over imported strains, and will hopefully encourage the further development of breeding groups working with locally adapted bees. The B4 Group, based in Cornwall, south west England is promoting the conservation of the dark European honey bee in a number of innovative ways, including the establishment of the UK’s first “black bee reserve”.

Honey bee mating behavior drives selection on local adaptation and disease resistance

Büchler, R.
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Honey bees show a highly complex mating behavior. They produce a huge surplus of drones in relation to the number of queens to be mated, build drone congregation areas and mate over long distances with up to 20 drones per queen, thus involving many contributing colonies from the local surroundings. As drones are haploid, they may directly express any genetic weakness, for example with regard to disease susceptibility. In fact, an experiment with 26 untreated drone colonies on the island mating station Norderney showed a high variability in the individual mating success of drones from differently infested colonies. Less infested colonies with higher mite resistance have a higher probability to transmit their genes to the next generation. Under natural conditions, selection will favor locally adapted populations with high disease resistance.
To utilize such natural selection effects, the breeder association AGT (Arbeitsgemeinschaft Toleranzzucht, www.toleranzzucht.de) manages some mating stations with drone colonies under high infestation pressure. Instead of a common chemical winter treatment, a biotechnical brood interruption treatment during summer is used to limit the mite infestation level below certain thresholds. Based on the positive experience from several seasons we suggest such a nature like control strategy for general beekeeping to support the development and spread of resistant stock.

Geordie bees bite the mite

Pritchard, D.
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"Geordie bees" are *A. m. mellifera* adapted to the Newcastle area of North-East England and they seem to be almost completely resistant to varroa. I have not treated mine for 16 years, but of several hundred colonies, have lost only 3 or 4 to the mite. This report describes one colony with many hybrid workers that developed a heavy infestation, but overcame it within several weeks, with many mutilated mites falling to the floor as if they had been bitten. The proportion of damaged mites was highest during the post-swarming capping interval, but also increased steadily as the brood nest later expanded and by the end of summer total mite drop had decreased to a negligible level. Altogether up to 9 strategies or occasions are indicated when mite numbers may be reduced by the bees, notably in relation to brood breaks.
It is suggested that inter-bee grooming is typically expressed at unusually high levels in north-British *A. m. mellifera* and that this is the basis of their resistance to varroa. In this colony, with many hybrid workers, excessive allogrooming arose only after mite numbers had greatly exceeded supposedly lethal levels: in late May total mite fall was 23 per day. Literature reports ascribe grooming damage to what could be called "emergency bees" that specialise in defensive allogrooming, which may have appeared in this case as a consequence of the stress of massive mite assault. It is suggested that emergency bees may develop as a result of disruption in juvenile hormone production in early worker development.

Diversity – a challenge for dark bee projects

Drivdal, N.J.
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Strategies in breeding efforts are vital, for the expected breeding progress and future breeding programmes, but not at least for bees ability to adapt to changes in environment and climate. It is urgent to spread knowledge about the vital role of genetic diversity.
– diversity of genes
– diversity of project strategies
– diversity of beekeeping
– diversity of breeding methods

Even though we have been discussing those issues from the first SICAMM conference on, I feel we are in need of continuing this. First of all, because there are still a lack of knowledge of the bees natural breeding dynamics and adaptation to environment, and also a lack of understanding the bees natural breeding dynamics and genetics. The field of biology genetics has still many challenges, as an example Dr. Christian Brochmann are organising projects to survey how inbreeding may influence the creation of new species. We need to find a way to express ourselves clearly, so that scientists and beekeepers may interact in a constructive manner. First of all we need to accept that we have different conditiones, traditions and challenges, and have choosen different methods and structures. 11

Sadly there has often been a lack of understanding in our discussions. Among the politicians and the public, we often get the inpression that their motivations are solely maximum profit as fast as possible. I am convinced that all in the SICAMM community share quite opposite values.

Sustainability: can we all work together?

Patterson, R.
Beekeeper and author, UK; e-mail: roger-patterson@btconnect.com

This presentation takes the main points from one I gave to a recent English conference "Sustainable Beekeeping: A future without Imports", but with a slightly different message. Although the U.K. is made up of islands, so a different situation than much of Europe, there are probably many other similarities that will allow us to promote dark bees together.
Standard beekeeping information is not often based on dark European bees, but those of Mediterranean origin, with teachers and writers simply "cutting and pasting" from elsewhere. Beekeepers believe what they are initially told, so are unlikely to change without persuasion. We must change culture if we want to succeed.

I will raise some issues that probably affect most of us, wherever we come from, with some suggested solutions. I believe that education is needed, but it needs organising throughout the dark bee range, not in isolation. In my view SICAMM is well placed to manage this so we are all working together, not duplicating or conflicting with what others are doing.

Bee breeding activity in Poland

Bieńkowska, M., Wilde, J., B. Panasiuk, B. & Gerula, D.
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Honey bee breeding in Poland has been regulated by governmental law for four honey bee sub-species: *A. m. mellifera* (commonly called the "national", "local" or "black" bee); *A. m. carnica*, *A. m. caucasica* and *A.m ligustica* over 40 years ago. The territory of Poland is a natural habitat for *A. m. mellifera* bees. Polish beekeepers started to import Caucasian queens from the former USSR countries and Carniolan queens, mainly from Danubian countries and Austria, during the last century. Uncontrolled importation caused hybridization of local bee stocks. The imported sub-species of bees, especially the Carniolan bees, began to dominate.

In Poland exist three types of breeding programs. One is for genetic improvement of the sub-species, cross-breeding programs where the breeders work mostly on breeding productive hybrids from two sub-species or from different breeding lines within a sub-species and the national Black Bee Genetic Resources Conservation Program for four lines of *Apis mellifera mellifera*: Asta, Pólnocna (North Bee), Kampinoska and Augustowska. The selection of breeding material is conducted in breeding apiaries, which realize breeding programs on double recording system: stationary recording in breeding apiaries and field recording of various cross breeds in selected commercial apiaries. Except of production traits like honey yield and spring development, there are also biological traits evaluated: swarming, wintering, gentleness, hygienic behavior, varroa infestation and in some apiaries SMR, that directly influence the production and make the apiary management easier.

Over 95 % of breeding apiaries in Poland use instrumental insemination to produce breeding queens and also queens for commercial colonies. Instrumental insemination with semen of selected breeds and isolated drones guarantees pure mating and selection. In Poland instrumental insemination of bee queens is used not only for breeding purpose but also on large scale for common beekeepers, and scores about 30,000 bee queens yearly (from 20,000 to 80,000 depending the year).

Totally in Poland beekeepers produce 282 256 queens, but registered breeders produce only 68 % of queens (190 575). Unregistered producers sell 37 130 Buckfast and 54 551 *A.m carnica* queens, that is about 32 %.

Table. Production of honey bee queens in registered breeding apiaries in Poland. Total produced	Virgin queens	Naturally mated	Instrumentally inseminated	
Apis mellifera carnica	180 363	122 272	37866	20 225
Apis mellifera caucasica	7 378	3946	1266	2 166
Apis mellifera mellifera	2 115	1031	318	766
Apis mellifera ligustica	719	462	238	19
Total	190 575	127 711	39 688	23 176