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A number of insect species perform vital functions, such as pollination, pest control and soil fertilization. Unfortunately, their diversity and abundance are threatened by habitat degradation or loss, pesticide use, invasive species or climate change. In the horticultural sector, poor agricultural practices, especially those based on excessive use of chemicals, have a major impact on the decline of pollinators, such as honey bees.

In Côte d'Ivoire, the MARIGO project addresses the agro-ecological transition of peri-urban horticultural practices, contributing to the sustainable and productive transformation of agriculture and food systems. Within this project, the introduction of beehives on farms undergoing agro-ecological transition is proving successful and has helped to raise public awareness of the negative impact of pesticides on bees and pollination, through its impact on the financial income from honey harvest. Despite this, the beekeeping industry is not yet optimally structured and honey is still mainly harvested through hunting wild colonies or by placing empty hives for the natural installation of swarms, which may or may not occur.

Within this project, we have started a genetic characterization of the endemic honeybee subspecies *Apis mellifera adansonii*. We were able to visit 63 hives in 28 sites distributed along a north-south and east-west gradient and collect 1264 bees: 294 drones and 970 workers. We are currently sequencing 96 of the drones to assess genetic structure, spatial distribution and diversity of the global population. The results will be of particular interest as they will describe the genetic structure of an unmanaged population and will allow testing eventual admixture with other subspecies we have in our current database.

Our sampling has shown the presence of the *Varroa* parasite in almost 70% of the colonies visited, possibly explaining a particularly high level of swarming observed, as a strategy for *Varroa* control.

These preliminary results will provide the basis for the genetic characterisation of honeybees in Côte d'Ivoire, a first step towards defining a local honey bee conservation strategy.

➤ Exploring the genetic landscape of honeybees in Côte d'Ivoire (Ivory Coast)

Kamila Canale Tabet
BeeGEES lab, GenPhySE, INRAE Toulouse, France

Transformer les Systèmes Alimentaires et l'Agriculture par une Recherche en Partenariat avec l'Afrique



Open Access

Amira Chibani Bahi Amar ^{1,*}, Nacera Tabet Aoul ^{1,2}, Riad Fridi ¹, Alain Vignal ³ and Kamila Canale-Tabet ^{3,*}

Exploring the Role of Beekeeping in Peri-urban Vegetable Farming Systems (Côte d'Ivoire)



An Entry Point for Agroecological Conversion?

Agroecological peri-urban market gardening in Côte d'Ivoire

Exploring the genetic landscape of honeybees in Côte d'Ivoire

49th Apimondia congress – Kamila Canale Tabet (BeeGEES, GenPhySE, Toulouse, France) - 27 September 2025

Among practices



Three research axes

Perception and integration of **beekeeping** among vegetable farmers within Agroecological Transition



INRAE

Impact of agricultural practices on **wild pollinator biodiversity**



Genetic Diversity analysis of *Apis mellifera*



Beekeeping practices : hives



highly varied local production

Local equipment production



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Exploring the genetic landscape of honeybees in Côte d'Ivoire
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Beekeeping practices : honey



Exploring the genetic landscape of honeybees in Côte d'Ivoire
49th Apimondia congress – Kamila Canale Tabet (BeeGEES, GenPh)

Genetic Diversity Analysis of *Apis mellifera* *Adansonii*



Article

Insights into the Maternal Ancestry of Côte d'Ivoire Honeybees Using the Intergenic Region *COI-COII*

Krouholé Abdoul Salam Coulibaly ^{1,2}, Muhammad Zeeshan Majeed ^{1,3} , Chao Chen ², Kolo YEO ⁴ , Wei Shi ^{2,*} and Chun-Sen Ma ^{1,*} 2019



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Évaluation de la diversité morphologique d'*Apis mellifera* L. *adansonii* (Latreille, 1804) dans le district du Bas-Sassandra, Sud-Ouest de la Côte d'Ivoire

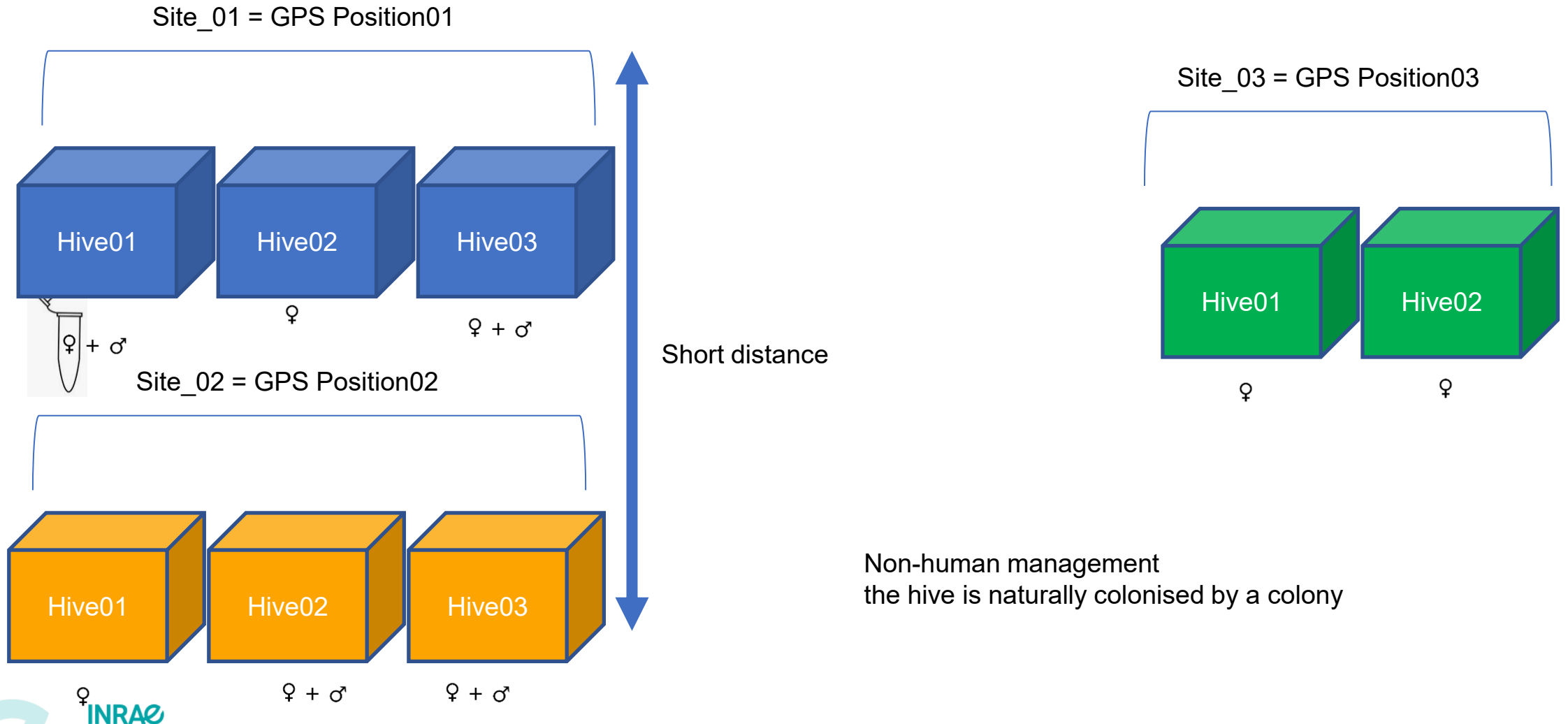
Léonie Clémence KOUONON*, Yao Eric Parfait YAO, Koudougnon Alice Estère GOBA, Kobenan Alexis KOFFI, Kouamé Guillaume KOFFI et Abouo Béatrice ADEPO-GOURENE

Université Nangui Abrogoua, Unité de Formation et Recherche Sciences de la Nature, Laboratoire de Biologie et Amélioration des Productions Végétales, 02 BP 801 Abidjan 02, Côte d'Ivoire

Sampling strategy

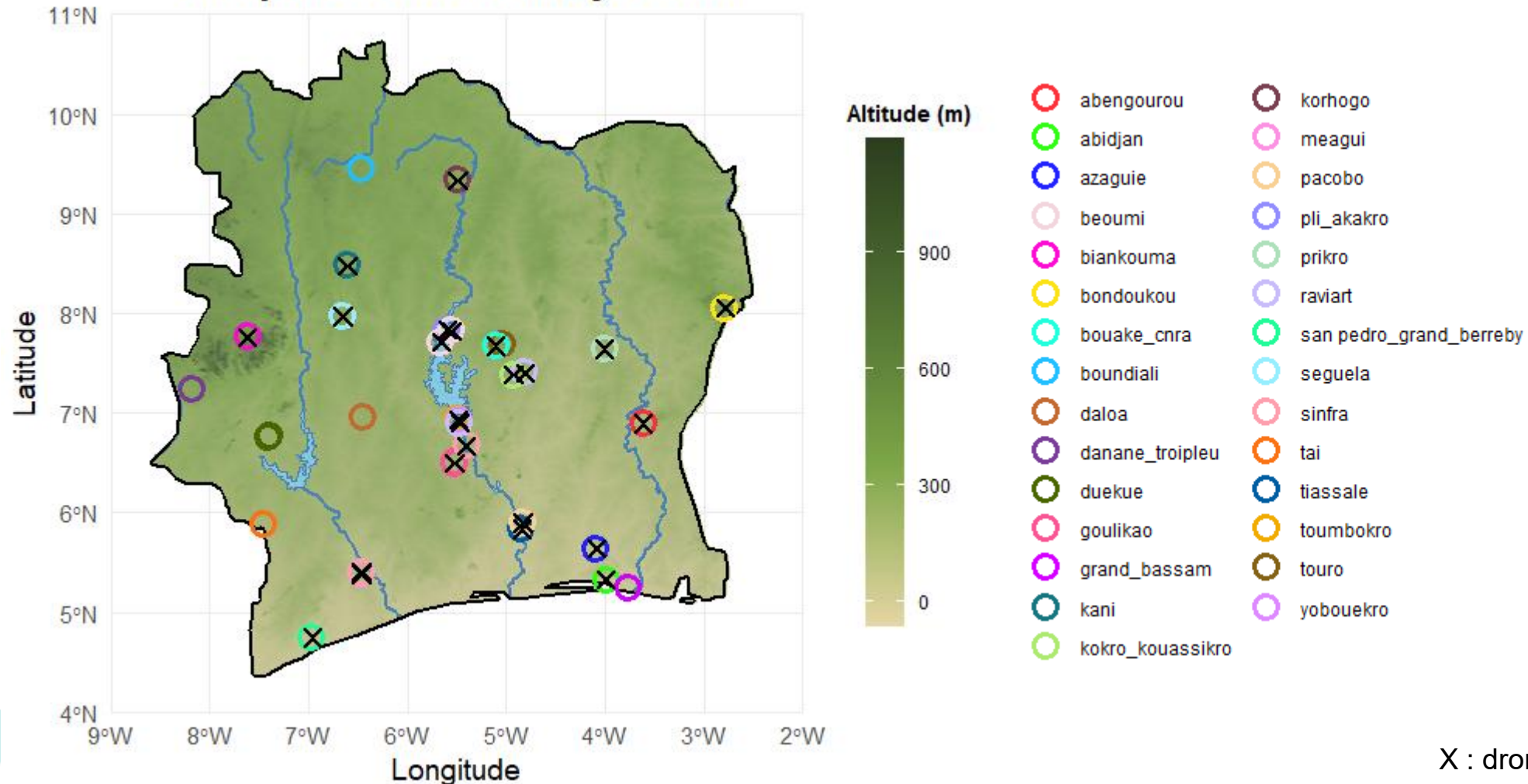


From each visited hive Drones ♂ when available + Workers ♀



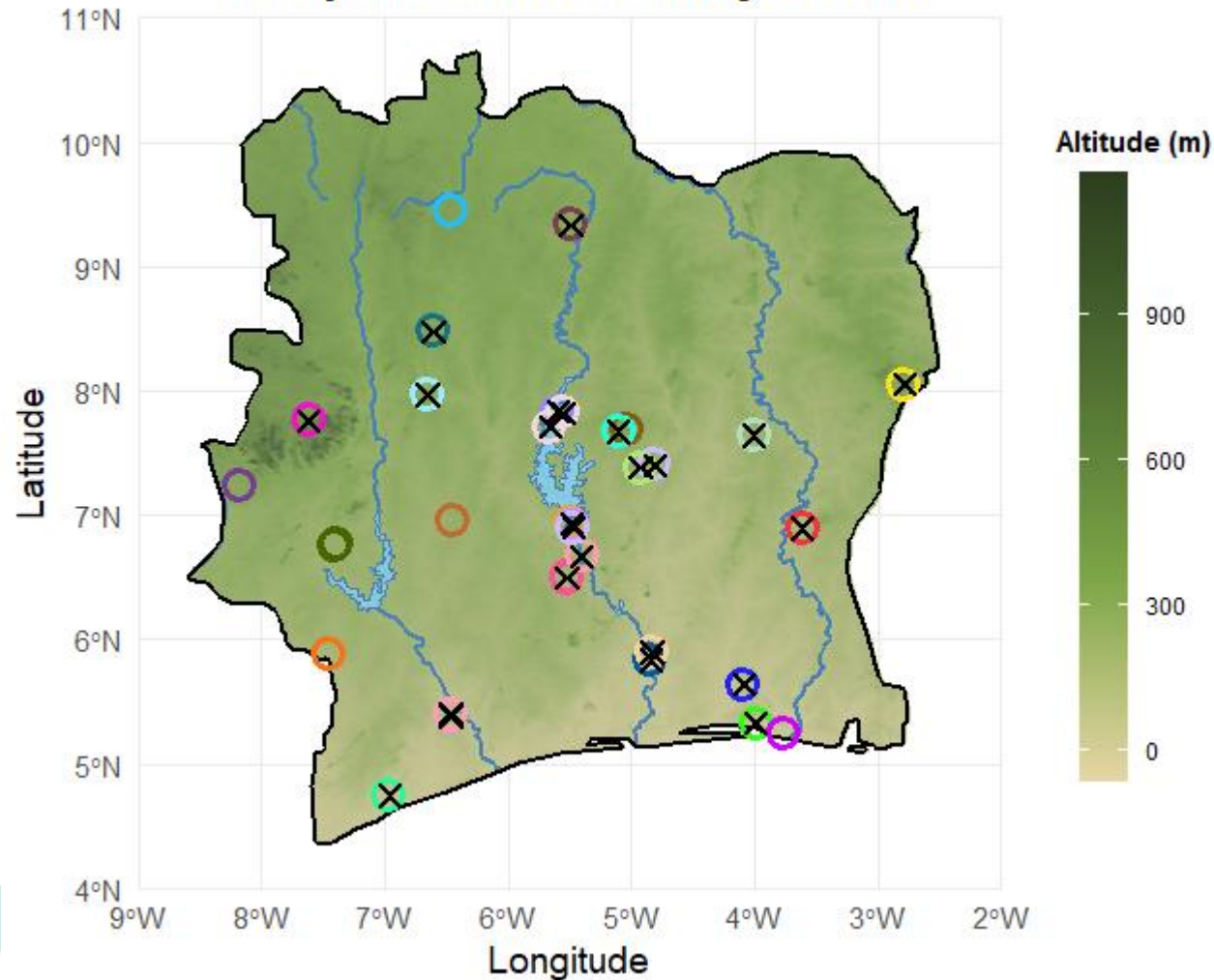
Geographical sampling : 29 sites

Sampled areas in Ivory Coast



Geographical sampling : 29 sites

Sampled areas in Ivory Coast



nb_site_with_males/total_sites : 21/29

nb_sites_without_males : 8



Results : Varroa is present but not only



Deformed Wing Virus



Wax moth



Molecular analysis whole genome sequencing of individual drones



DNA extraction



Libraries preparation
Sequencing AVITI Element Biosciences
INRAE Get-Plage platform

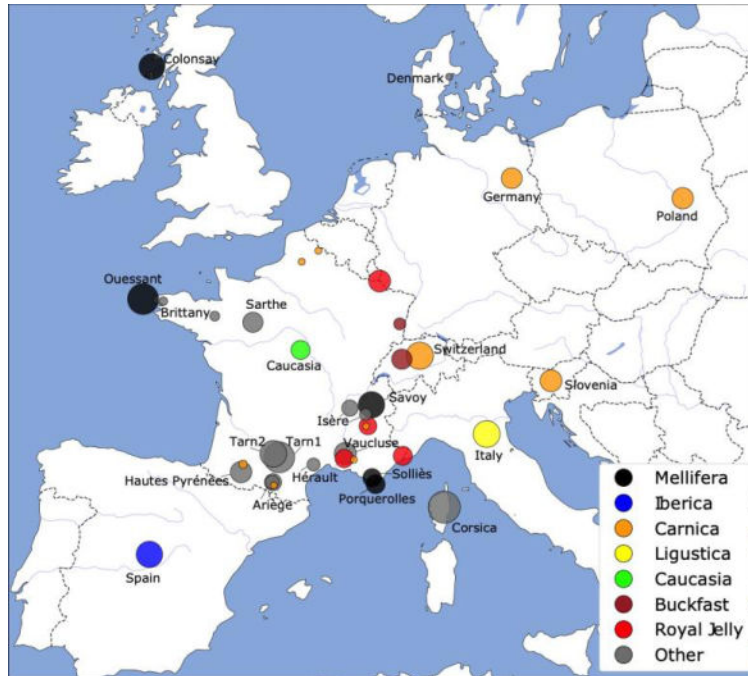
Genome previously sequenced in our lab

RESOURCE ARTICLE

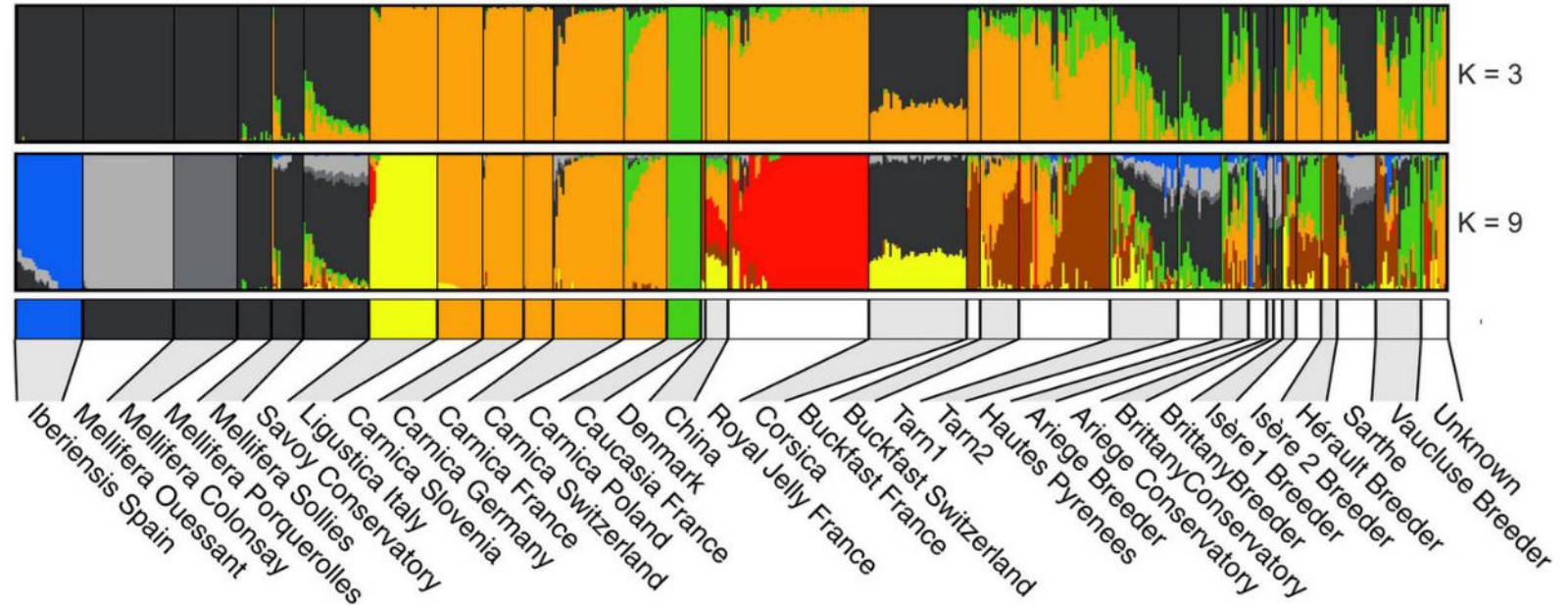
MOLECULAR ECOLOGY
RESOURCES WILEY

Complex population structure and haplotype patterns in the Western European honey bee from sequencing a large panel of haploid drones

David Wragg¹ | Sonia E. Eynard¹ | Benjamin Basso² | Kamila Canale-Tabet¹ |
Emmanuelle Labarthe¹ | Olivier Bouchez³ | Kaspar Bienefeld⁴ |
Małgorzata Bieńkowska⁵ | Cecilia Costa⁶ | Aleš Gregorc⁷ |
Per Kryger⁸ | Melanie Parejo⁹ | M. Alice Pinto¹⁰ | Jean-Pierre Bidanel¹¹ |
Bertrand Servin¹ | Yves Le Conte¹² | Alain Vignal¹



Sub-
Beek: species



3 main genetic backgrounds (K=3) in Western Europe

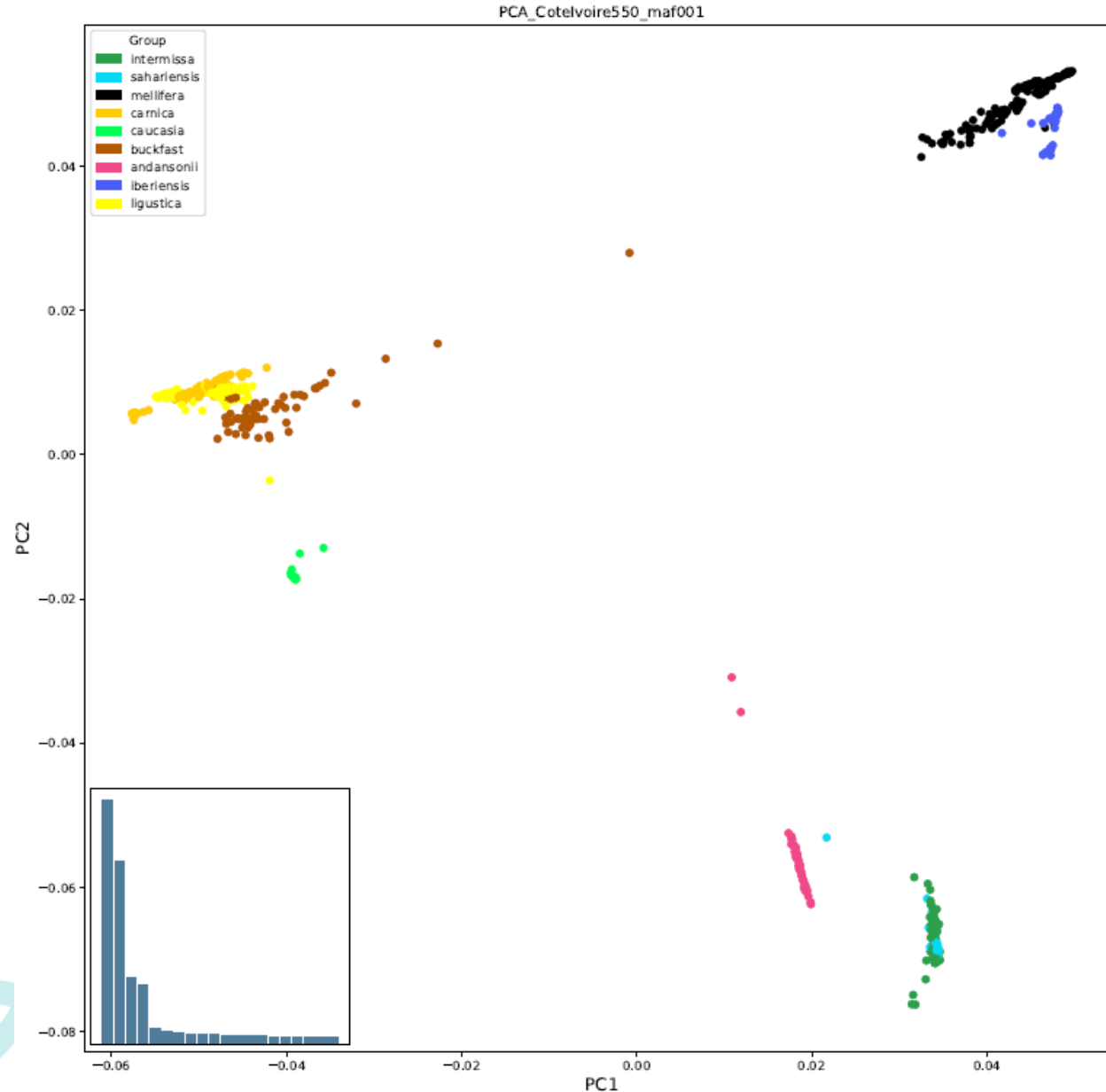
Black (M-lineage), yellow (C) and Caucasian (O) honey bees

9 genetic groups in this dataset (K=9):

- Black honey bees (M) subdivided in 4 groups (within *A. m. mellifera* & *iberiensis* subsp)
- Yellow honey bees (C) subdivided in 3 groups (within *A. m. carnica* & *ligustica* subsp)
- A single Caucasian group (O) in our dataset (*A. m. caucasia*)
- A specific background found for the Buckfast lineage

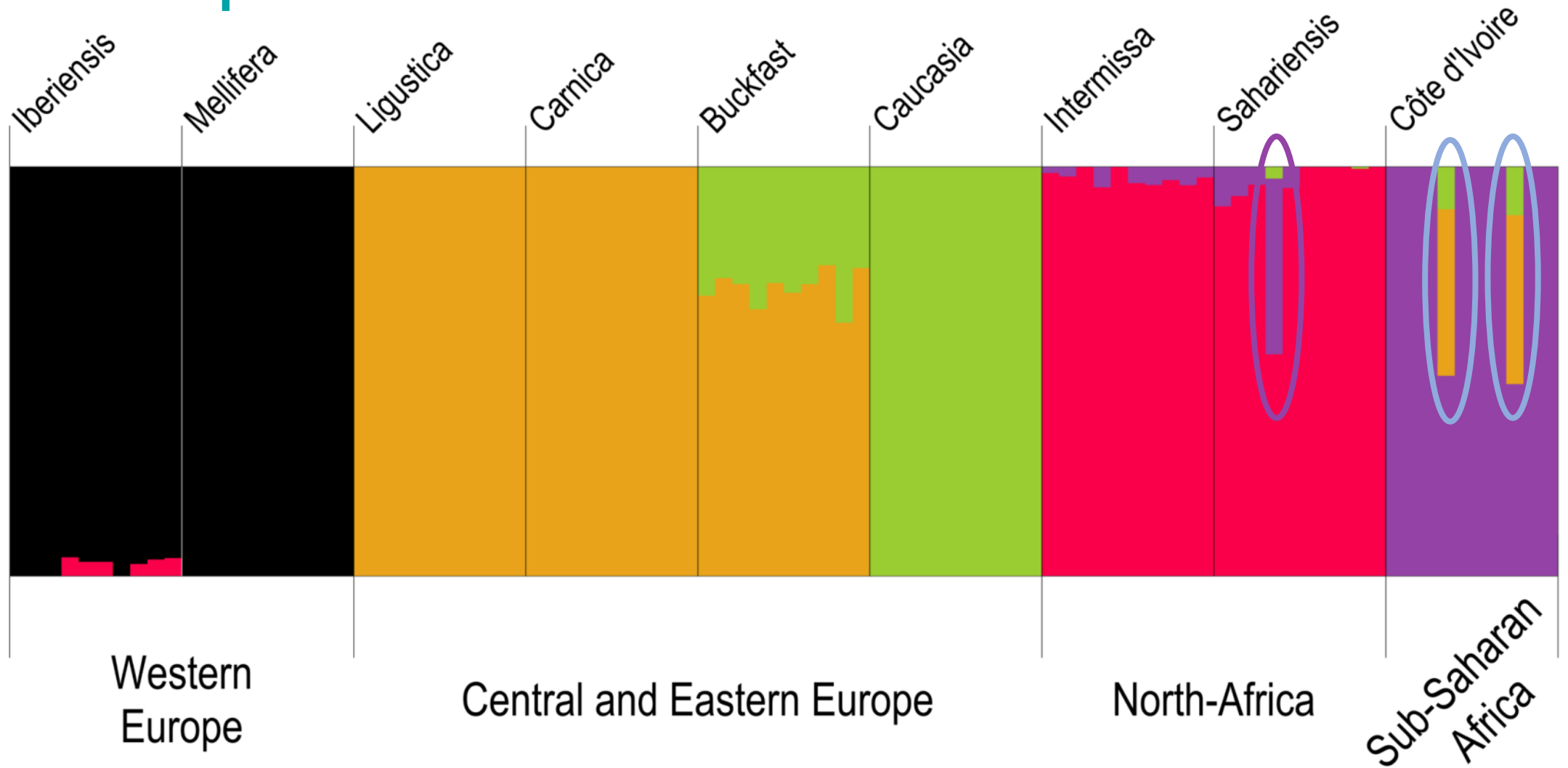
INRAE

Population structure PCA

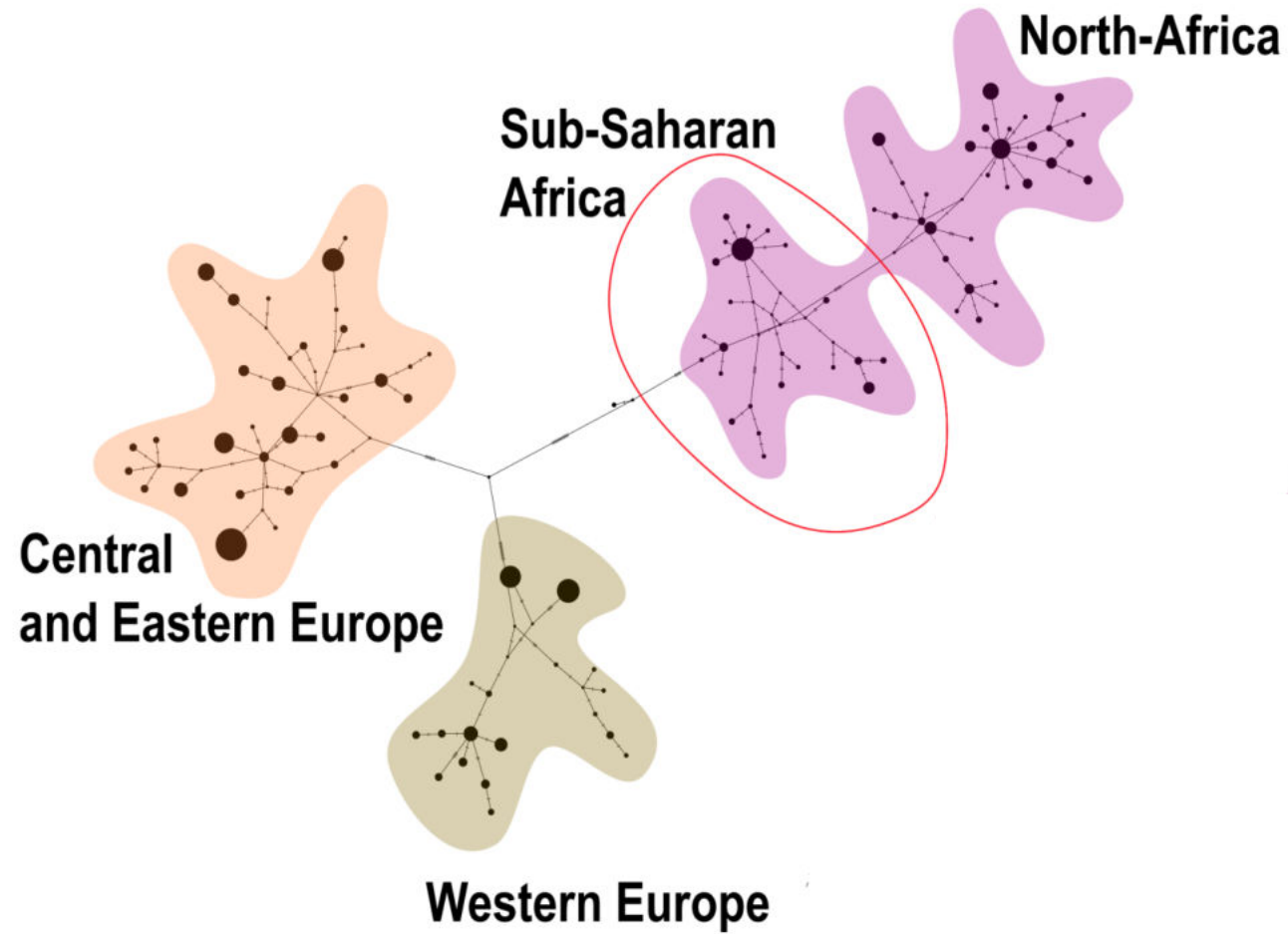


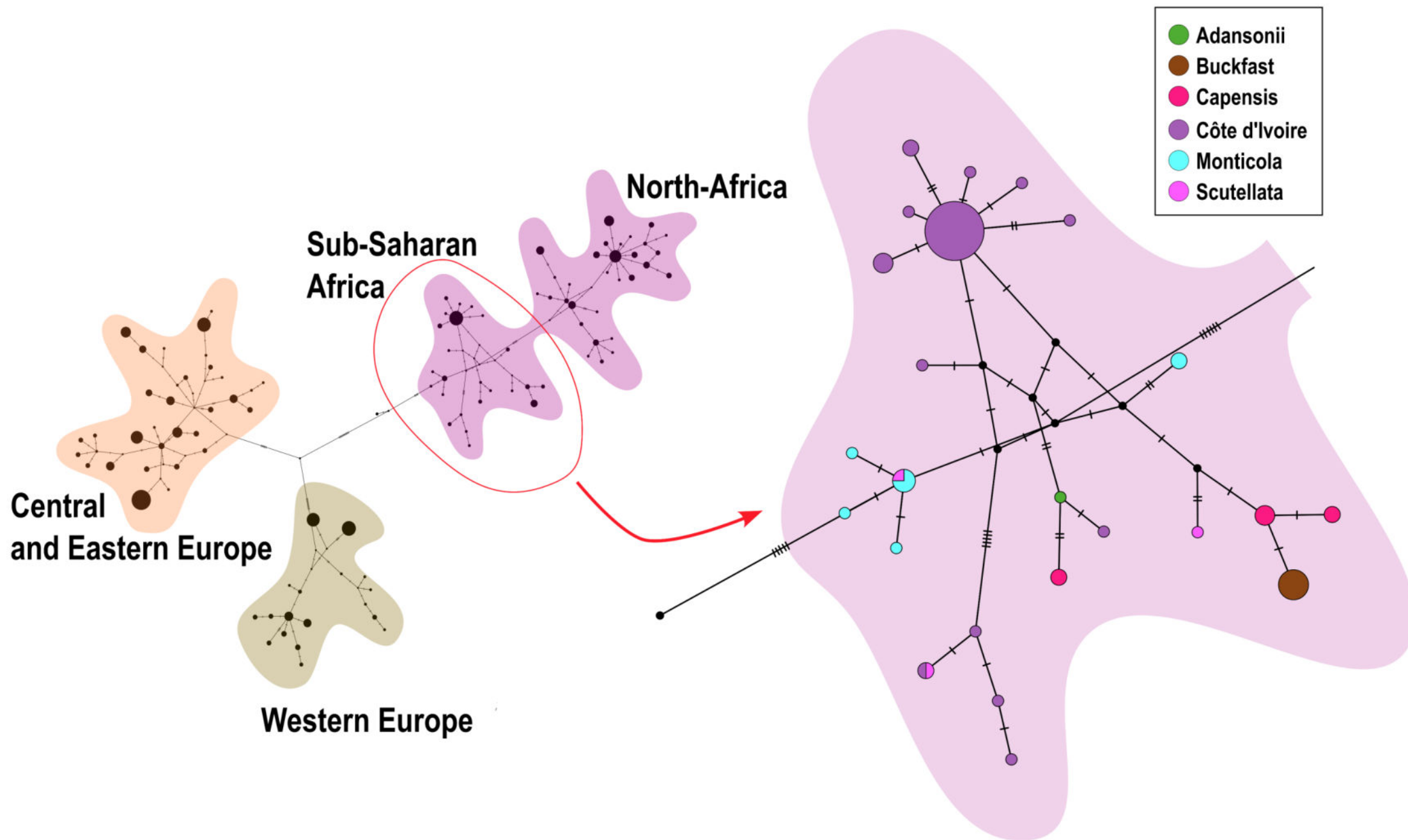
Population structure : Admixture

$K = 5$



Mitochondrial sequence





Conclusions : preliminary results

- Sampling strategy covered north–south and east–west transects.
- **African and European bee populations show clear genetic differentiation.**
 - Further analysis are ongoing on genome and mitochondrial sequences
- Varroa mites were detected in all colonies; frequent swarming may serve as a natural control mechanism.
- **Wild pollinators** : need of precise identification in collaboration with entomologists. An integrated approach combining morphological identification, DNA barcoding, and complete mitochondrial genome sequencing.





All the farmers and beekeepers in Côte d'Ivoire

Thibaud Martin
Emilie Deletre
Ivalda Koyo Nzala



INRAE



