

## Evaluating the Effectiveness of Proxy-Based Environmental Variables in Detecting Genomic Responses to Pesticide Stress in *Apis mellifera*

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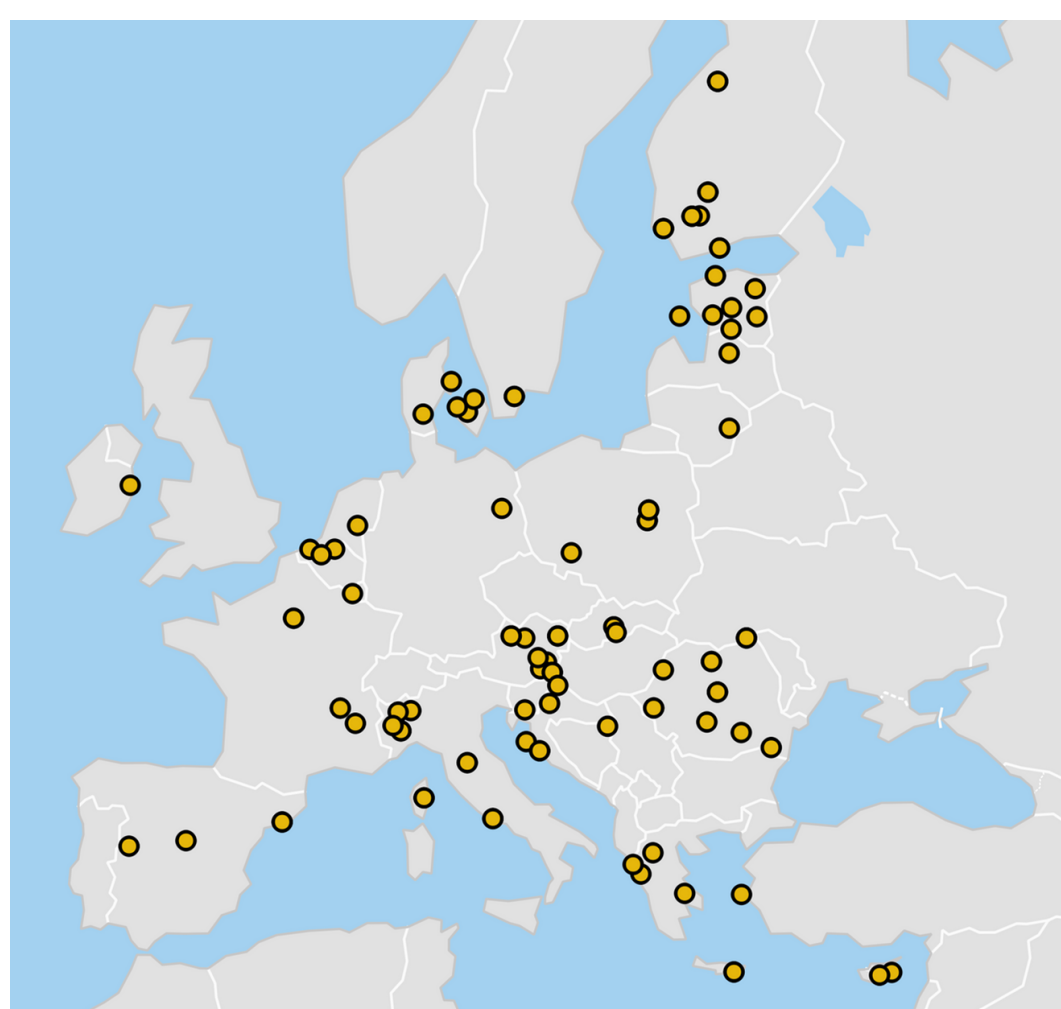
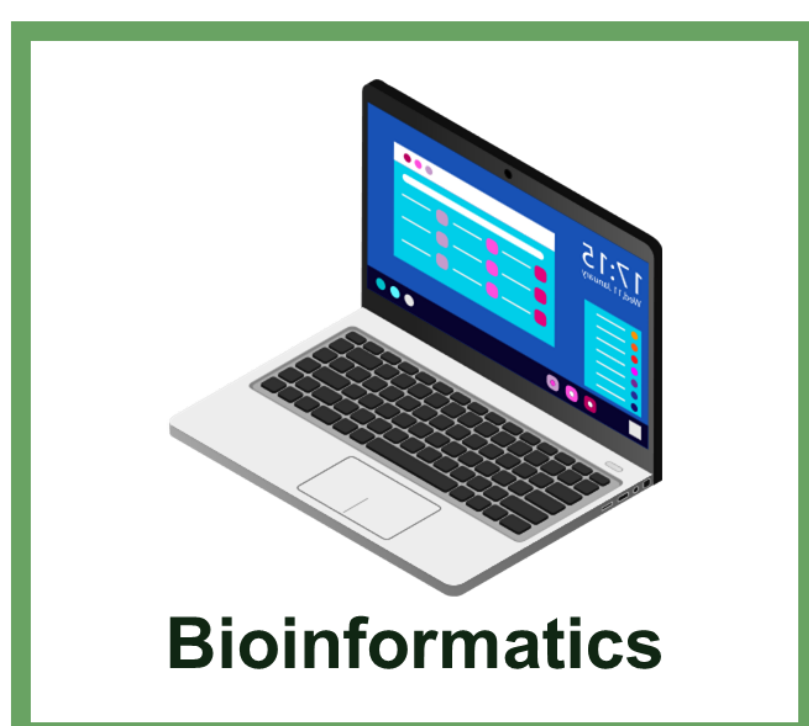
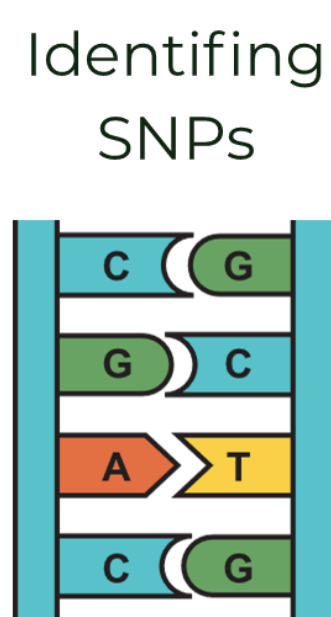
### INTRODUCTION & AIM

DESPITE WELL-DOCUMENTED IMPACTS OF PLANT PROTECTION PRODUCTS (PPPS) ON HONEYBEES' SURVIVAL AND BEHAVIOR, THEIR MOLECULAR CONSEQUENCES REMAIN UNDEREXPLORED.

#### GOALS:

- IDENTIFY GENOTYPE-ENVIRONMENT ASSOCIATIONS IN HONEY BEES
- UNDERSTANDING GENETIC ADAPTATION TO ANTHROPOGENIC STRESSORS
- EVALUATING IF LAND COVER AND DATA FROM PEST CHEMGRIDS CAN BE USED TO MEASURE PPPS IMPACTS

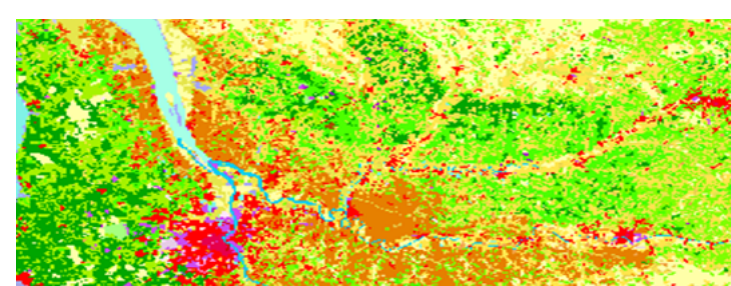
### METHOD



102 HONEY BEES, OVER 2 MILLION VARIANTS AND A GENOTYPING RATE OF 0.975

#### CORINE LAND COVER

- USES LATITUDE/LONGITUDE
- PERCENTAGE OF AGRICULTURE IN A 3KM



#### PEST CHEMGRIDS

- USES LATITUDE/LONGITUDE
- AVERAGE PESTICIDE



#### INSIGNIA API STRIPS

- INSIGNIA PROJECT
- DATA FROM INSIDE THE COLONY

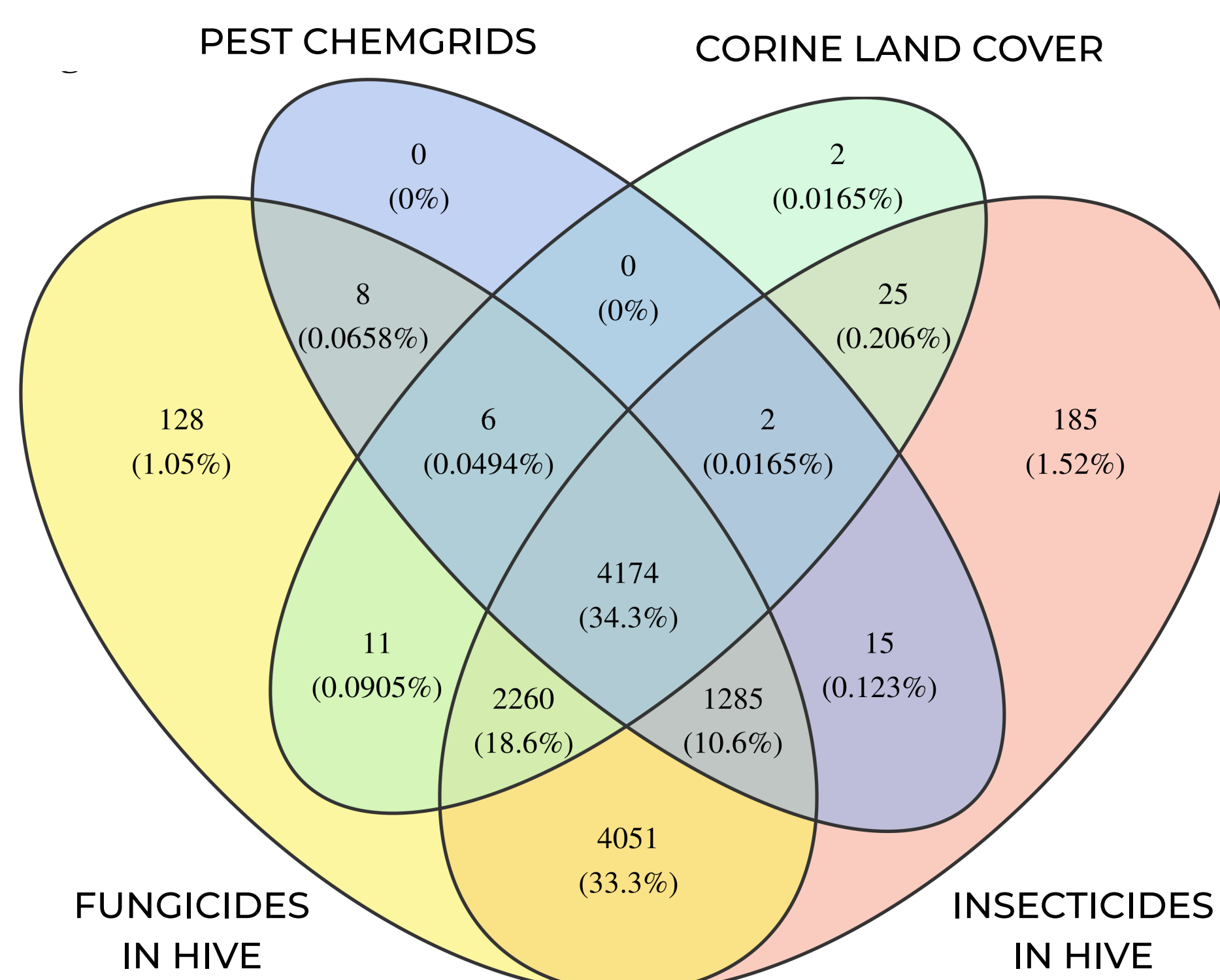


#### GEA TESTS

- REDUNDANCY ANALYSIS (RDA)
- SAMBADA
- LATENT FACTOR MIXED MODELS (LFMM2)

### RESULTS & DISCUSSION

#### GENE INTERSECTION:



### CONCLUSION

- ACROSS ALL ENVIRONMENTAL DATASETS, THERE ARE 4,174 GENES IN COMMON, REPRESENTING A 34.3% OVERLAP.
- ALMOST ALL PROXY-RELATED GENES ARE ALSO FOUND TO BE CORRELATED WITH REAL-WORLD PESTICIDE EXPOSURE DATA (API-STRIPS).
- CORINE AND PEST-CHEMGRIDS EMERGE AS POWERFUL PROXIES FOR ASSESSING ENVIRONMENTAL EXPOSURE AND ITS GENOMIC IMPACT.

### REFERENCES

