Ministry for Primary Industries
Manatū Ahu Matua

Erasmus Mundus
NESSIE

Bio-Protection
Bioprotection science for New Zealand

Using pest assemblages to rank species with potential to invade: the self organizing map analysis, validation and recommendations

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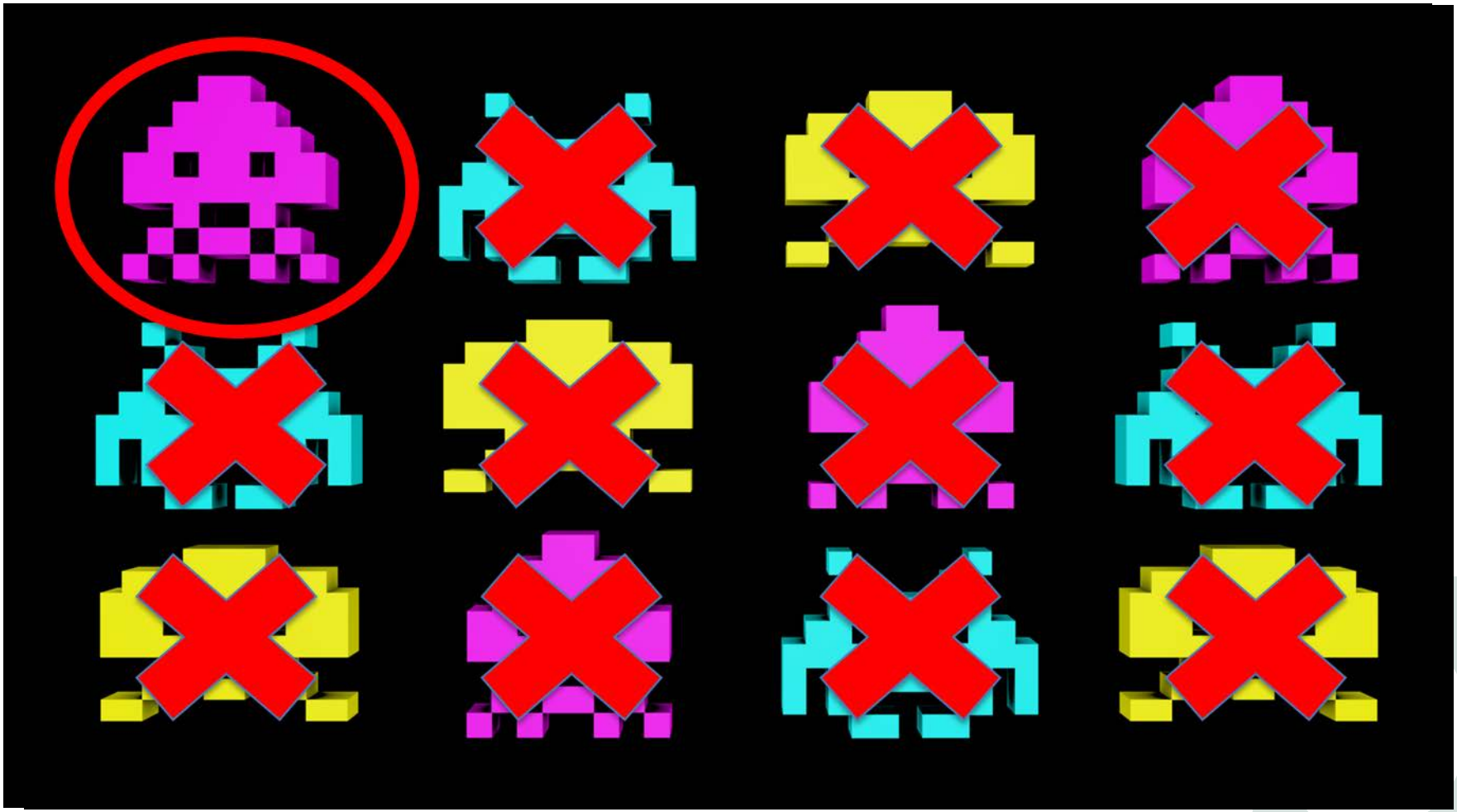
Species listing process

Which species?

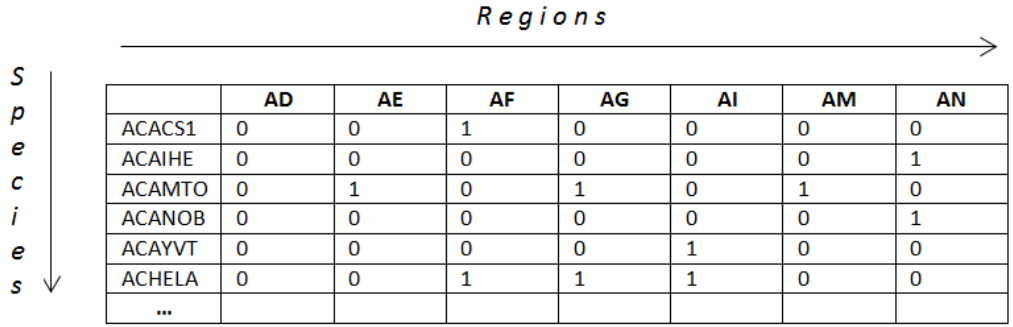


Regional pest assemblages

Pest profile

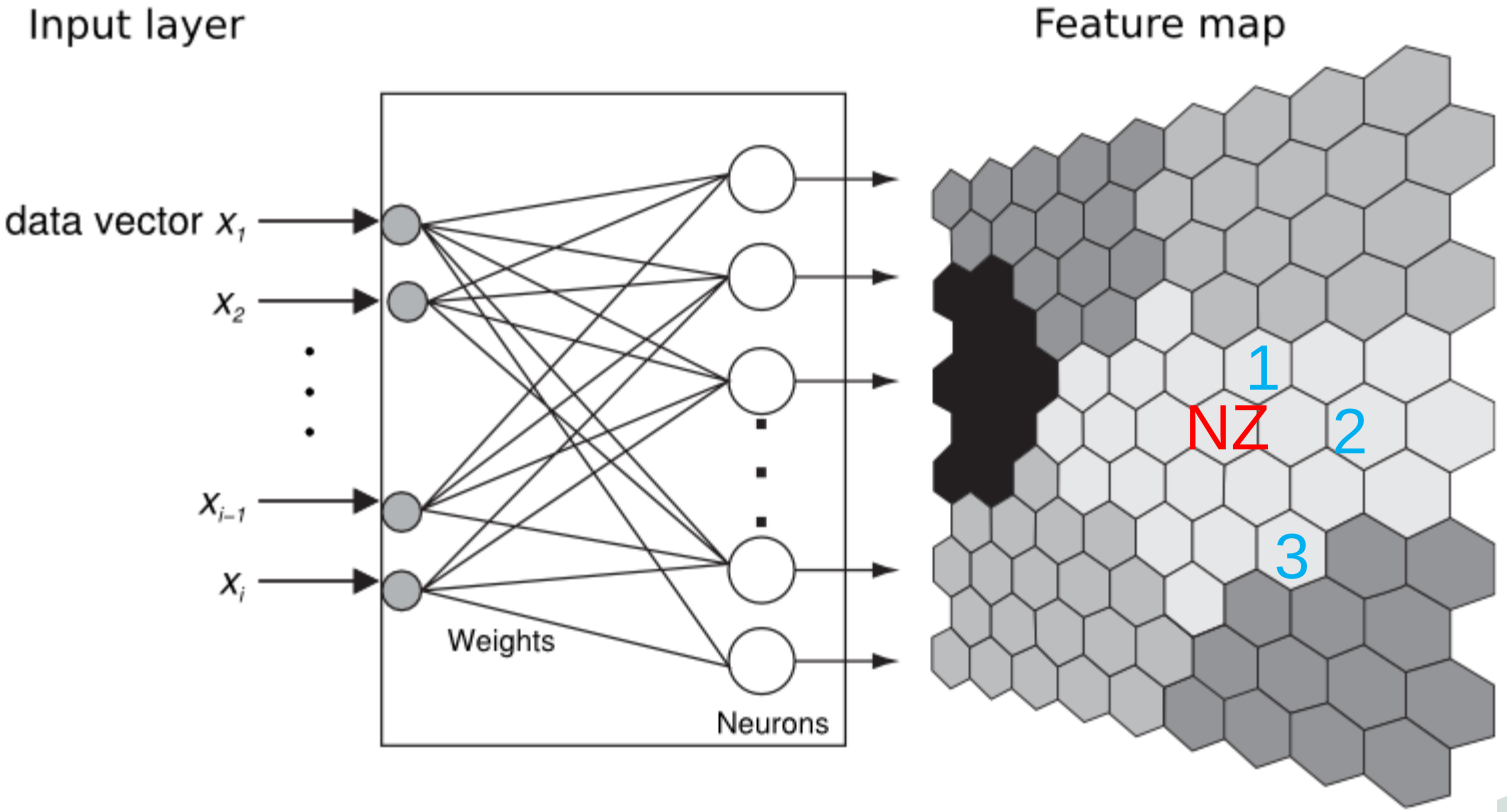
region	Species1	Species 2	Species 3	Species4	…	Species873
New Zealand	1	0	0	1	…	1

Matrix with 452 regions and 873



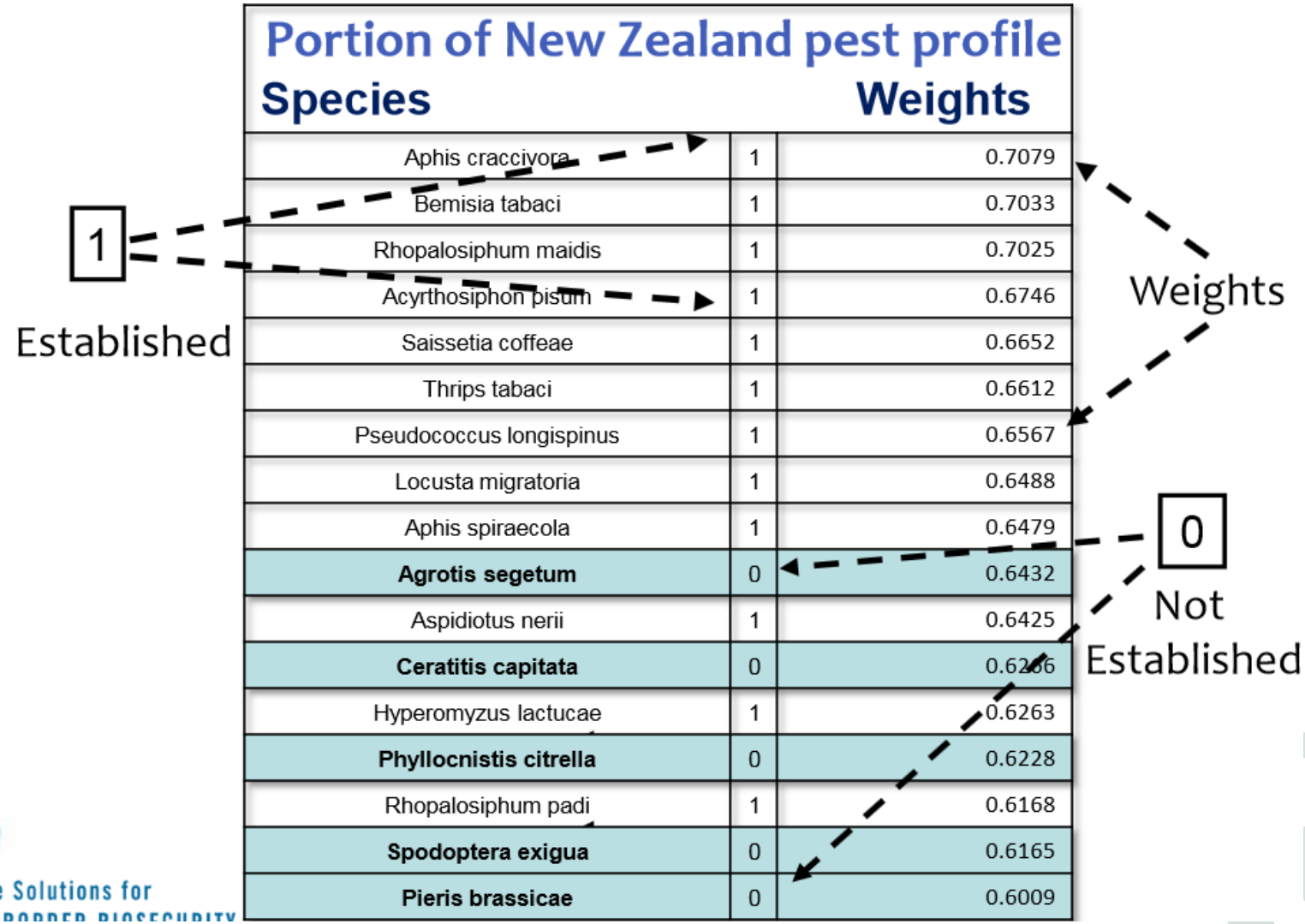
	AD	AE	AF	AG	AI	AM	AN
ACACS1	0	0	1	0	0	0	0
ACAIHE	0	0	0	0	0	0	1
ACAMTO	0	1	0	1	0	1	0
ACANOB	0	0	0	0	0	0	1
ACAYVT	0	0	0	0	1	0	0
ACHELA	0	0	1	1	1	0	0
…							

The method – The self organizing map



1,2,3 – countries classified close to NZ by the SOM

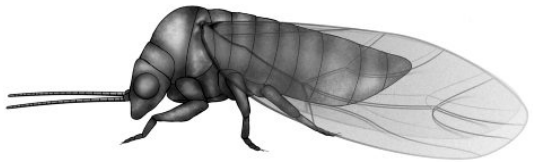
Background 3 – The outputs



Worner and Gevrey 2006

Who else is using it?






First application	2006 – Worner and Gevrey
Sensitivity analysis (Australian data)	2010 – Paini et al
SOM validation(New Zealand data)	2010/2011 – Watts and Worner, Worner and Souquet
SOM application (Finnish data)	2011 – Vanninen et al.
SOM validation (USA data)	2011 – Suiter,
SOM validation (simulated data)	2011 – Paini et al
SOM integration into a PRA framework	2013 – Singh et al
SOM application (weeds)	2014- Morin et al.
SOM validation	2014 – Roige and Worner [in preparation]

Research objectives

Objective 1: Sensitivity analysis of the SOM approach

Objective 2: Investigate whether other algorithms can perform SOMs the best clustering method for absence/presence data to indicate risk of invasion?

Objective 3: Adding more information to the regional profiles. Adding climate and host data?

Testing the weights and the ranks - METRADISC

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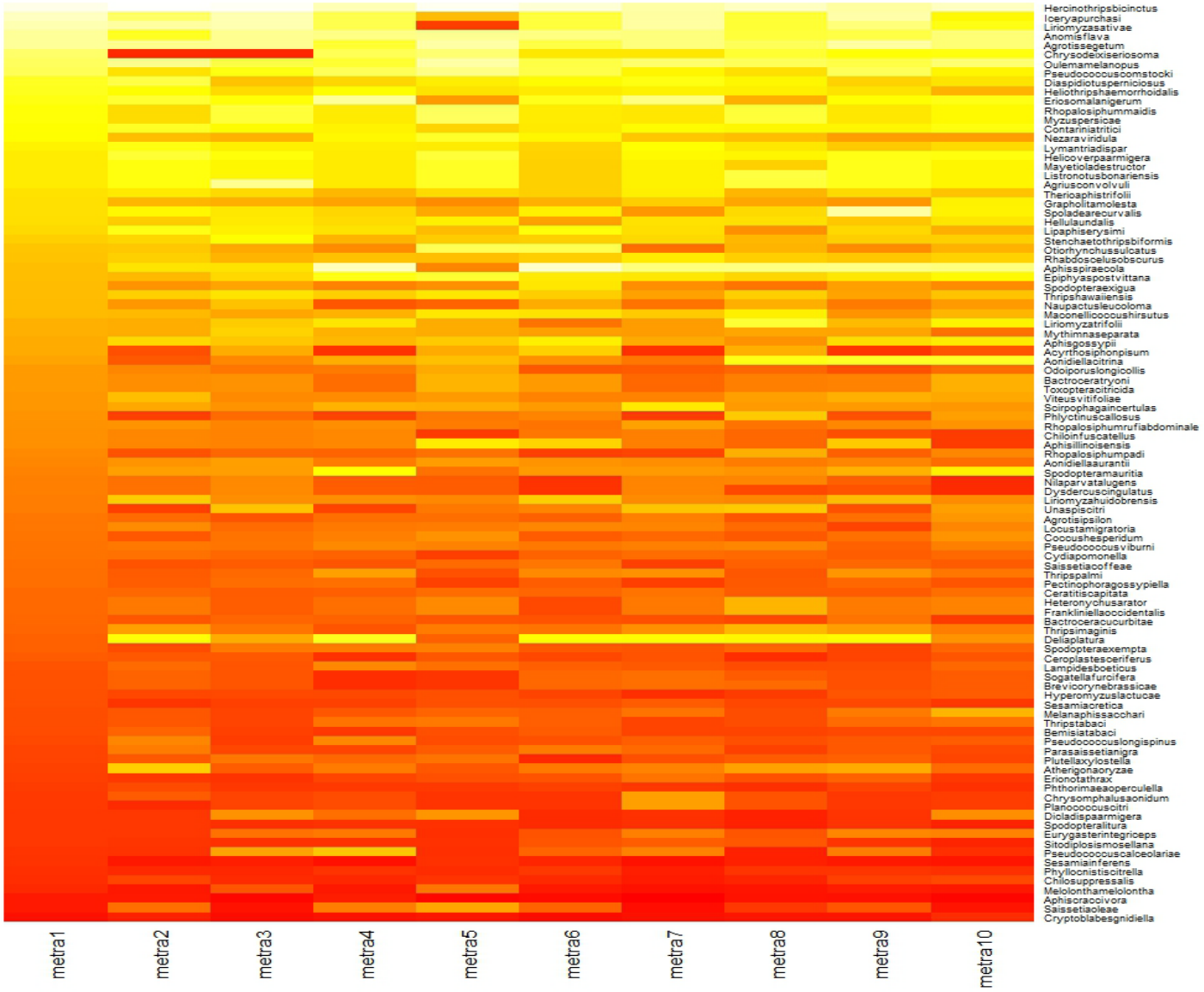
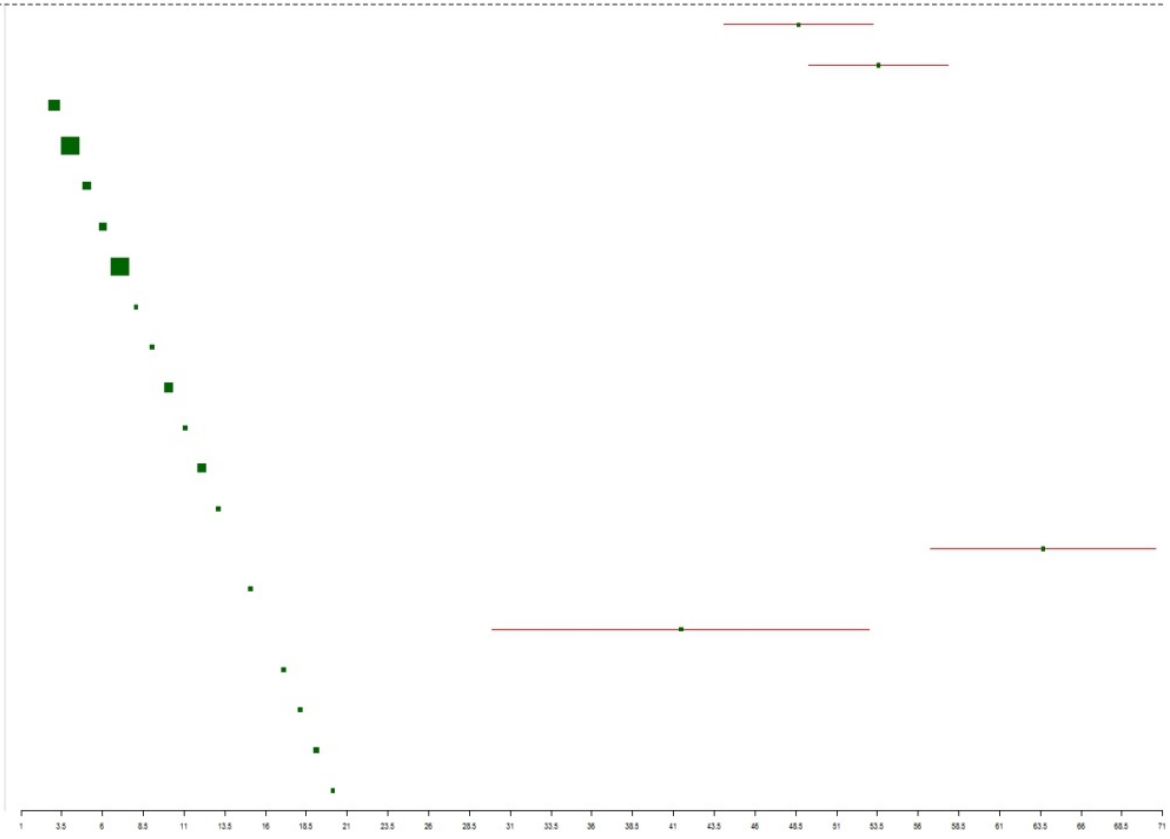


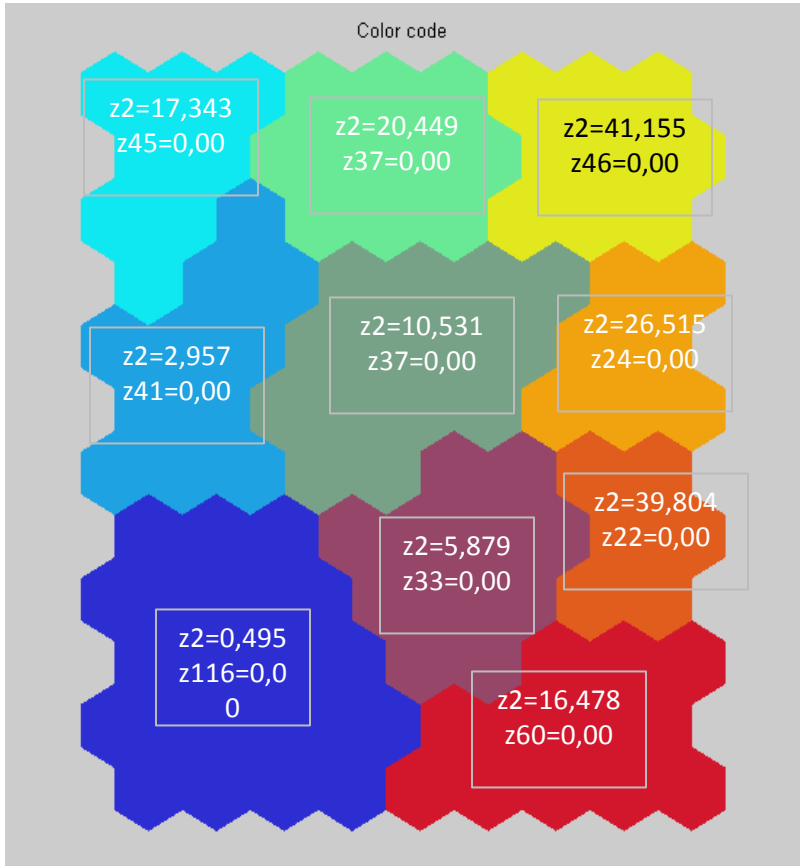
Testing the weights and the ranks - METRADISC

Species	R.mean (average)
Helicoverpaarmigera	48.66093
Agriusconvolvuli	53.57238
Brevicorynebrassicae	3.01718
Nezaraviridula	4.02291
Plutellaxylostella	5.02864
Myzuspersicae	6.03436
Aphisgossypii	7.04009
Aonidiellaaurantii	8.04172
Rhopalosiphummaidis	9.04685
Planococcuscitri	10.05727
Acyrthosiphonpisum	11.0627
Coccushesperidum	12.06873
Agrotisipsilon	13.07405
Bemisiatabaci	63.66334
Eriosomalanigerum	15.08631
Iceryapurchasi	41.45962
Rhopalosiphumrufiabdominale	17.09766
Aphiscraccivora	18.10279
Thripstabaci	19.10892
Lampidesboeticus	20.11405

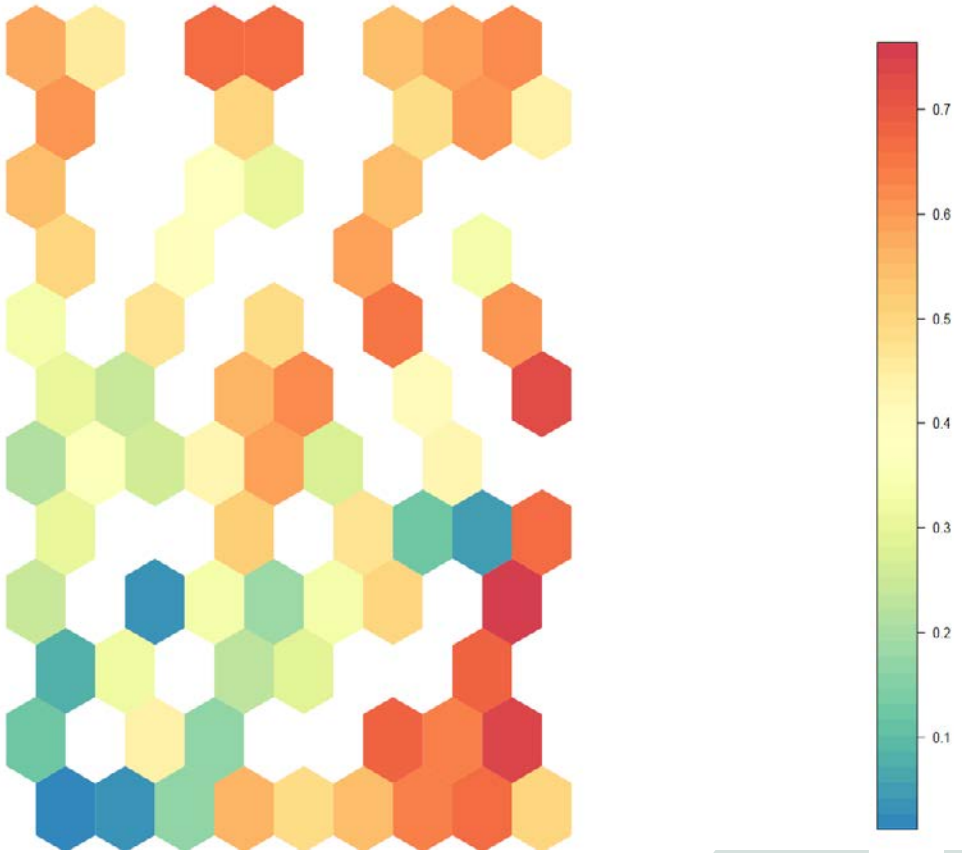


Clustering validation Z-metric

Values of Z2 and Zhighest by cluster



Values of Z/Z1 per cell



Objective 2 - A posteriori multi technique analyses

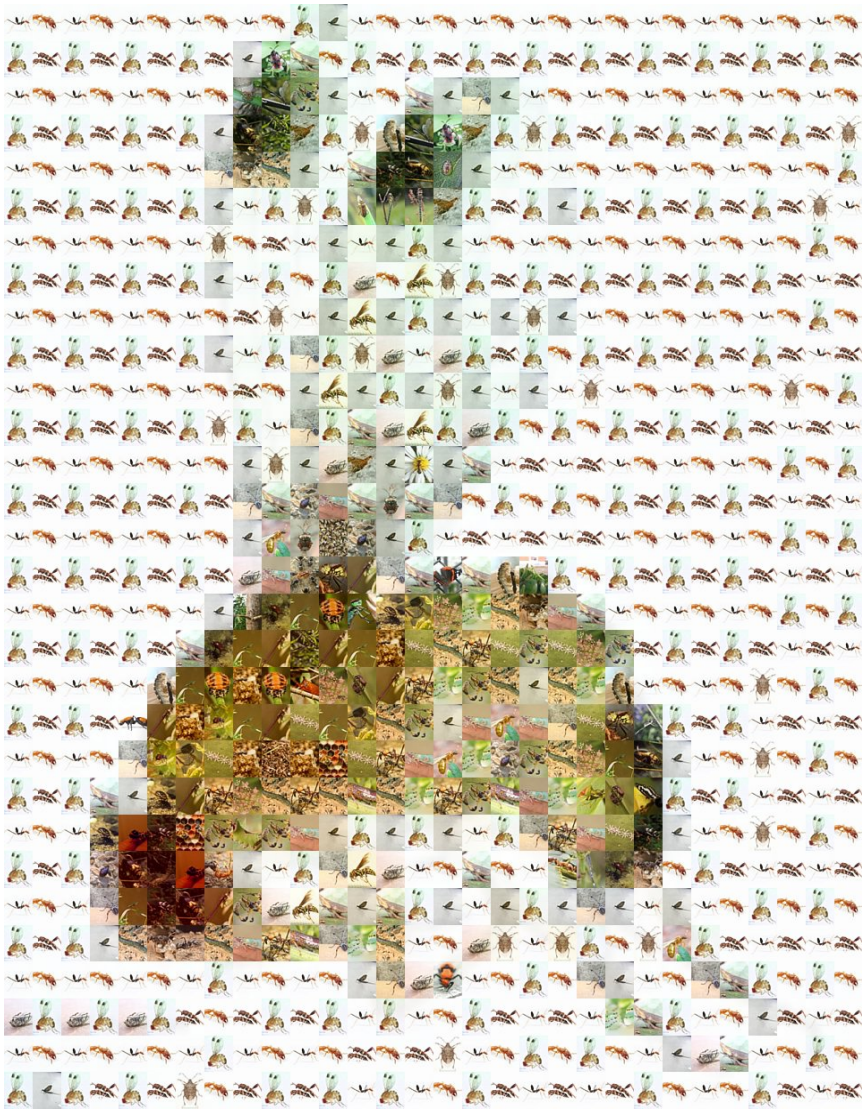
SOMs K-Means Hierarchical Classification Fuzzy Classification

CABI 2006

CABI 2014

TRUE POSITIVES **Species that were predicted as high risk (>0.70) and that are now invasive (1)**	**FALSE POSITIVES** **Species that were predicted as high risk (>0.70) and are still absent (0).**
TRUE NEGATIVES **Species that were predicted as low risk (<0.2) and are still absent (0).**	FALSE NEGATIVES Species that were predicted as low risk (<0.2) and are now invasive (1).

Future research



Thank you

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