

INSIGNIA-EU

Risultati in Italia

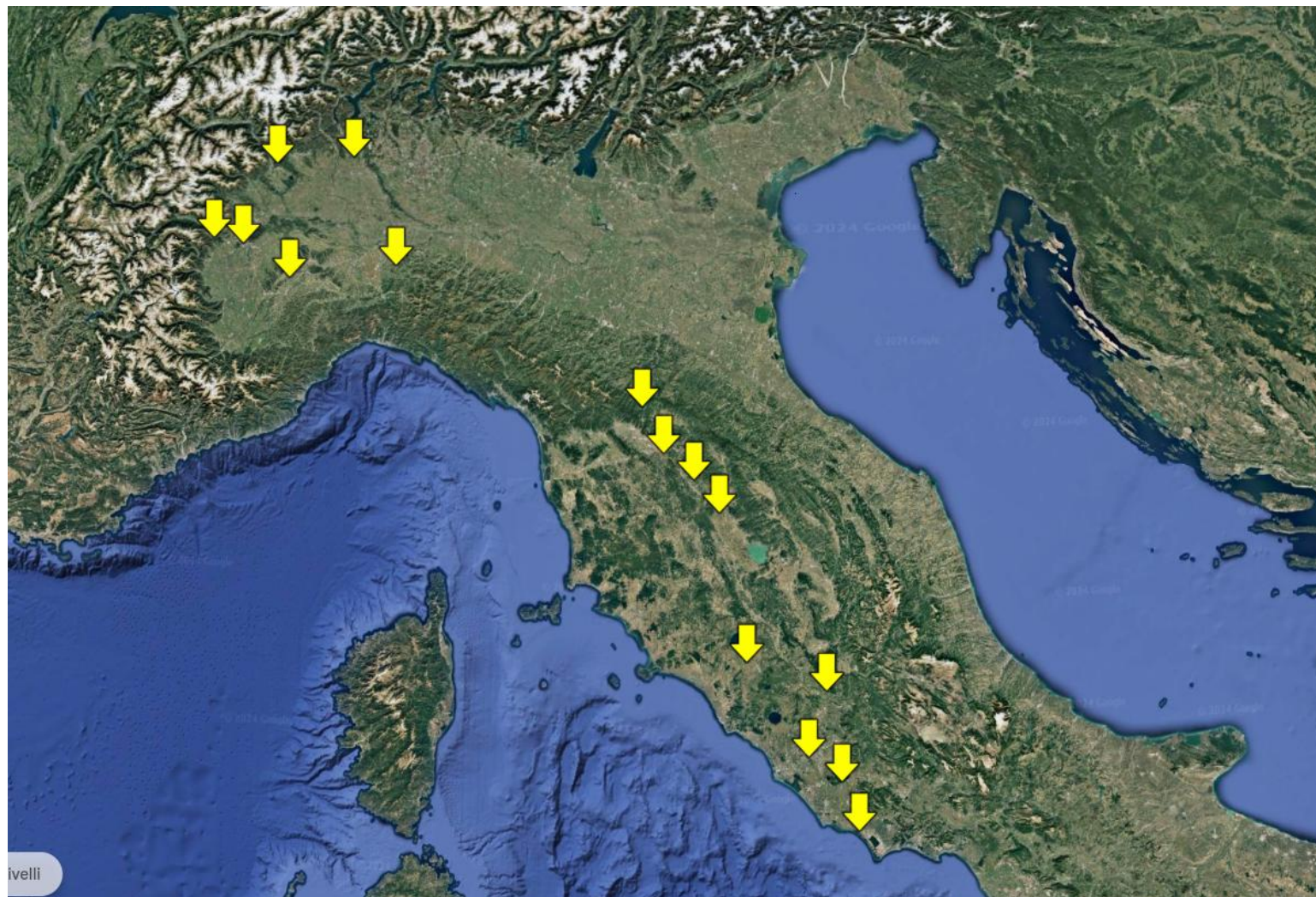


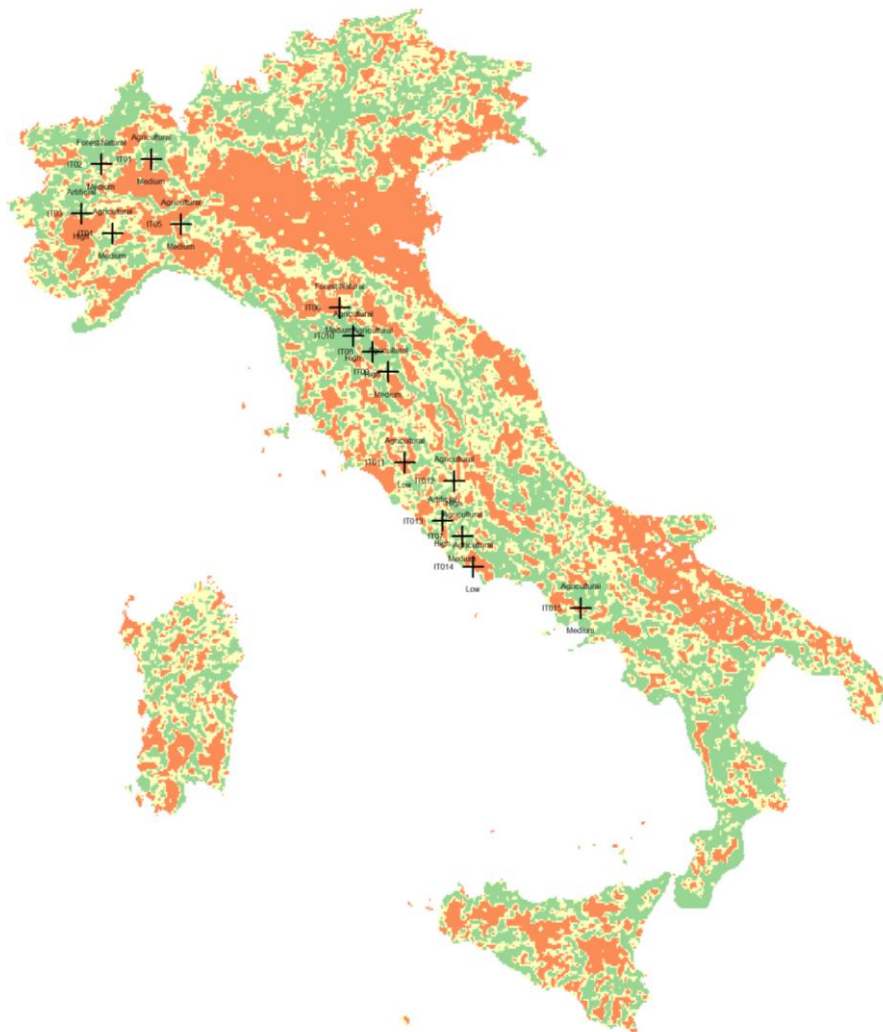
Dr. Marco Pietropaoli



Funded by
the European Union



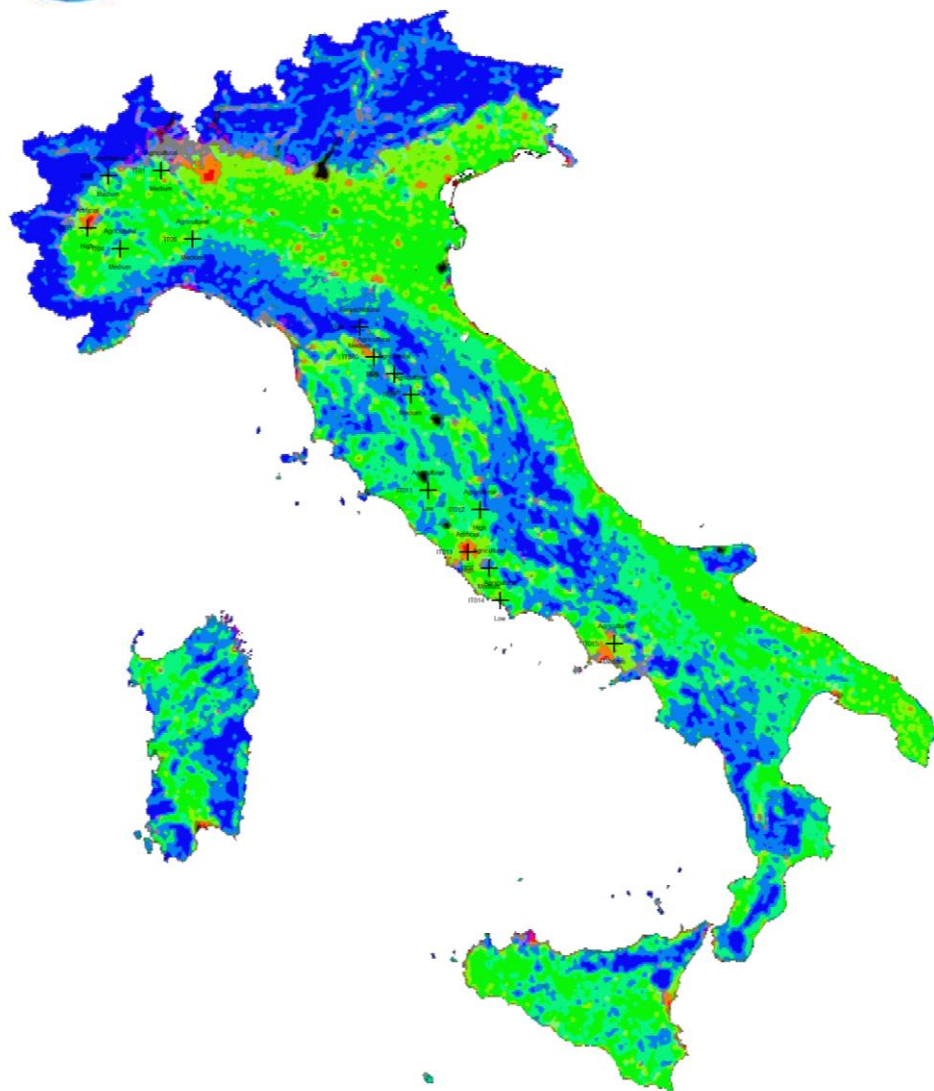




Gli apiari in Italia

Uso del suolo





Gli apiari in Italia

Tipologia ambiente



Gli apiari in Italia

Codice Apiario	Classe di Shannon	Uso del suolo principale
IT01	Medium	Agricultural
IT02	Medium	Forest/Natural
IT03	High	Artificial
IT04	Medium	Agricultural
IT05	Medium	Agricultural
IT06	Medium	Forest/Natural
IT07	Medium	Agricultural
IT08	High	Agricultural
IT09	Medium	Agricultural
IT010	High	Agricultural
IT011	Low	Agricultural
IT012	High	Agricultural
IT013	High	Artificial
IT014	Low	Agricultural
IT015	Medium	Agricultural



Gli apiari in Italia...per somiglianza di ambiente

Codice Apiario	Classe di Shannon	Uso del suolo principale
IT08	High	Agricultural
IT010		
IT012		
IT01	Medium	Agricultural
IT04		
IT05		
IT07		
IT09		
IT015		
IT011	Low	Agricultural
IT014		
IT03	High	Artificial
IT013		
IT02	Medium	Forest/Natural
IT06		



Iniziamo con i pesticidi



Iniziamo con i pesticidi

Nelle Apistrips:

75 molecole ricercate

Risultati espressi in ppb

Plastificatore	DMPF
POP	HCB
Preservante	γ -2,3,4,6-Tetrachlorophenol
Repellente	DEET
Solvente	DMF
	γ -1,2,4-Trichlorobenzene
Stabilizzatore	Diphenylamine

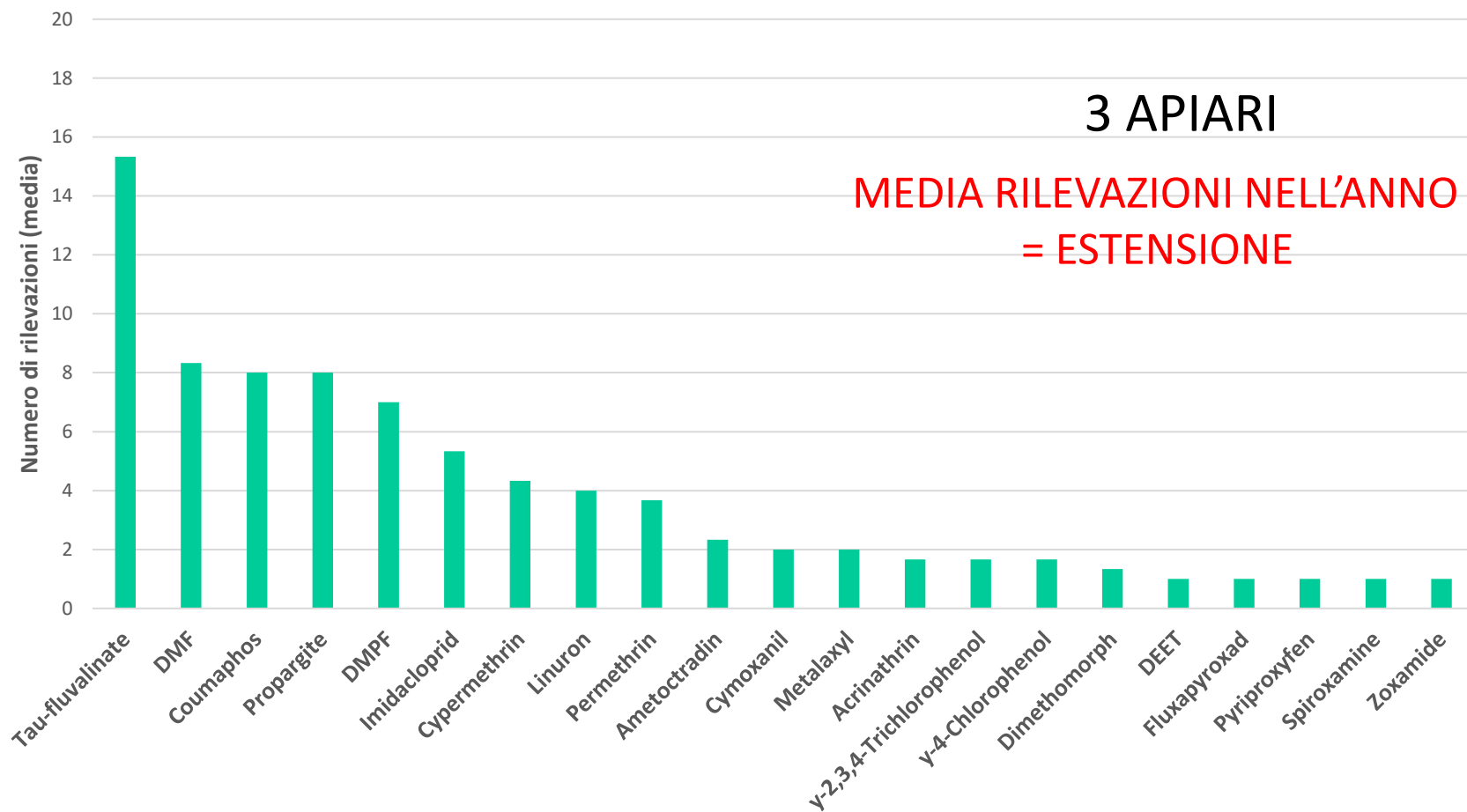
Tipologia	Molecola	Tipologia	Molecola
Fungicida	Ametoctradin	Insetticida	2,4'-DDE
	Azoxystrobin		4,4'-DDD
	Boscalid		4,4'-DDE
	Bupirimate		4,4'-DDT
	Carbendazim		Acetamiprid
	Cymoxanil		Acrinathrin
	Cyprodinil		Bendiocarb
	Difenoconazole		Chlorantraniliprole
	Dimethomorph		Chlorfenvinphos
	Dodine		Chlorpyrifos
	Epoiconazole		Coumaphos
	Fludioxonil		Cypermethrin
	Fluopicolide		Deltamethrin
	Fluquinconazole		Etofenprox
	Fluxapyroxad		Fipronil
	Mandipropamid		Flupyradifuron
	Metalaxyl		Imidacloprid
	Metconazole		Lindane
	Metrafenone		Permethrin
	Myclobutanil		Phosmet
	Oxathiapipronil		Pyriproxyfen
	Penthiopyrad		Tau-fluvalinate
	Picolinafen	Erbicida	Fenuron
	Procymidone		Linuron
	Propamocarb		Metolachlor
	Pyraclostrobin		Pendimethalin
	Pyrimethanil		Propyzamide
	Spiroxamine	Acaricida	Propargite
	Tebuconazole		Spirodiclofen
	Tecnazene	Disinfettante	γ -1,4-Dichlorobenzene
	Thiabendazole		γ -2,4-Dichlorophenol
	Trifloxystrobin		γ -2,6-Dichlorophenol
	Zoxamide		γ -4-Chlorophenol
	γ -2,3,4-Trichlorophenol		γ -Triclosan

Top 20 pesticidi zona

HIGH AGRICULTURAL

3 APIARI

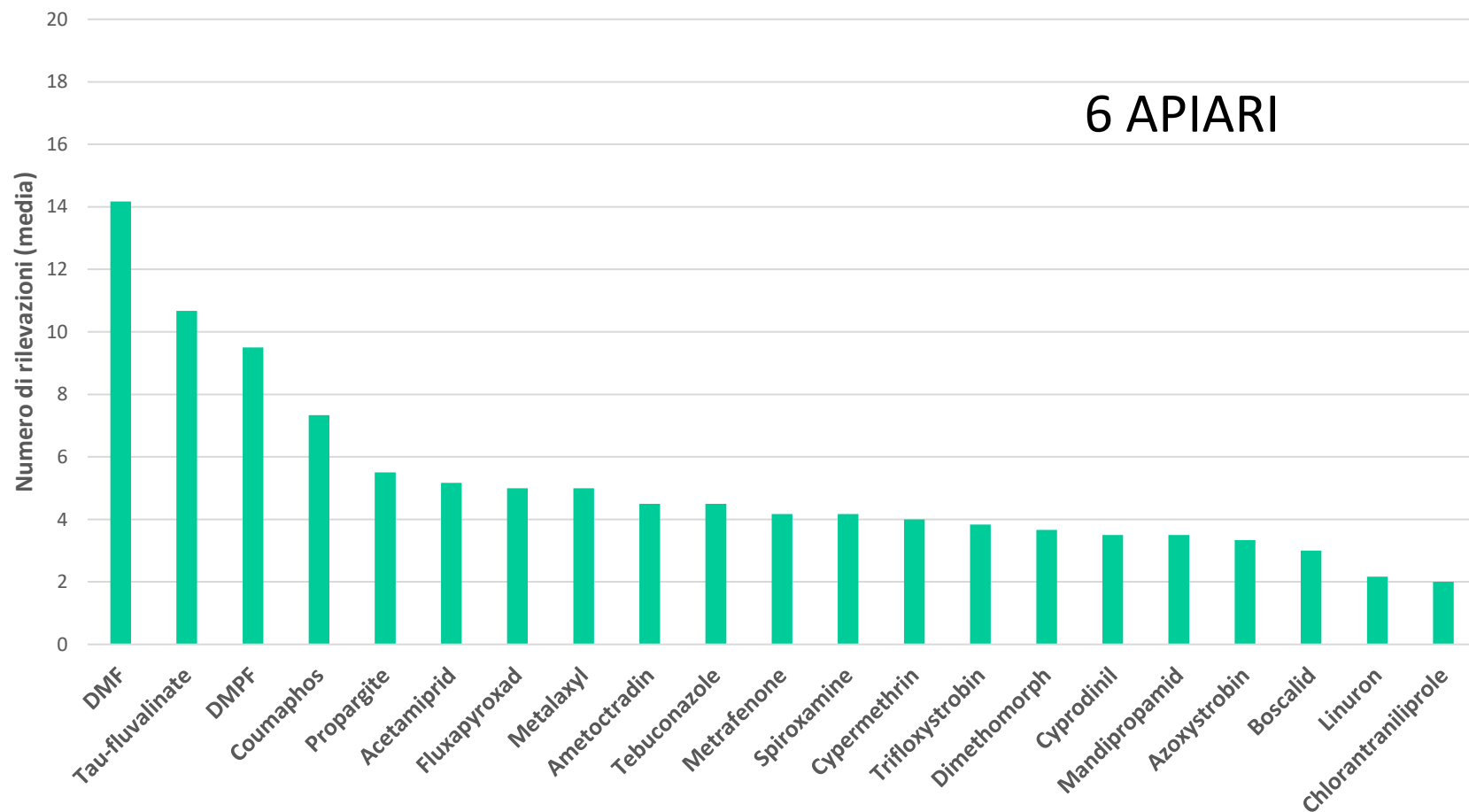
**MEDIA RILEVAZIONI NELL'ANNO
= ESTENSIONE**



Top 20 pesticidi zona

MEDIUM AGRICULTURAL

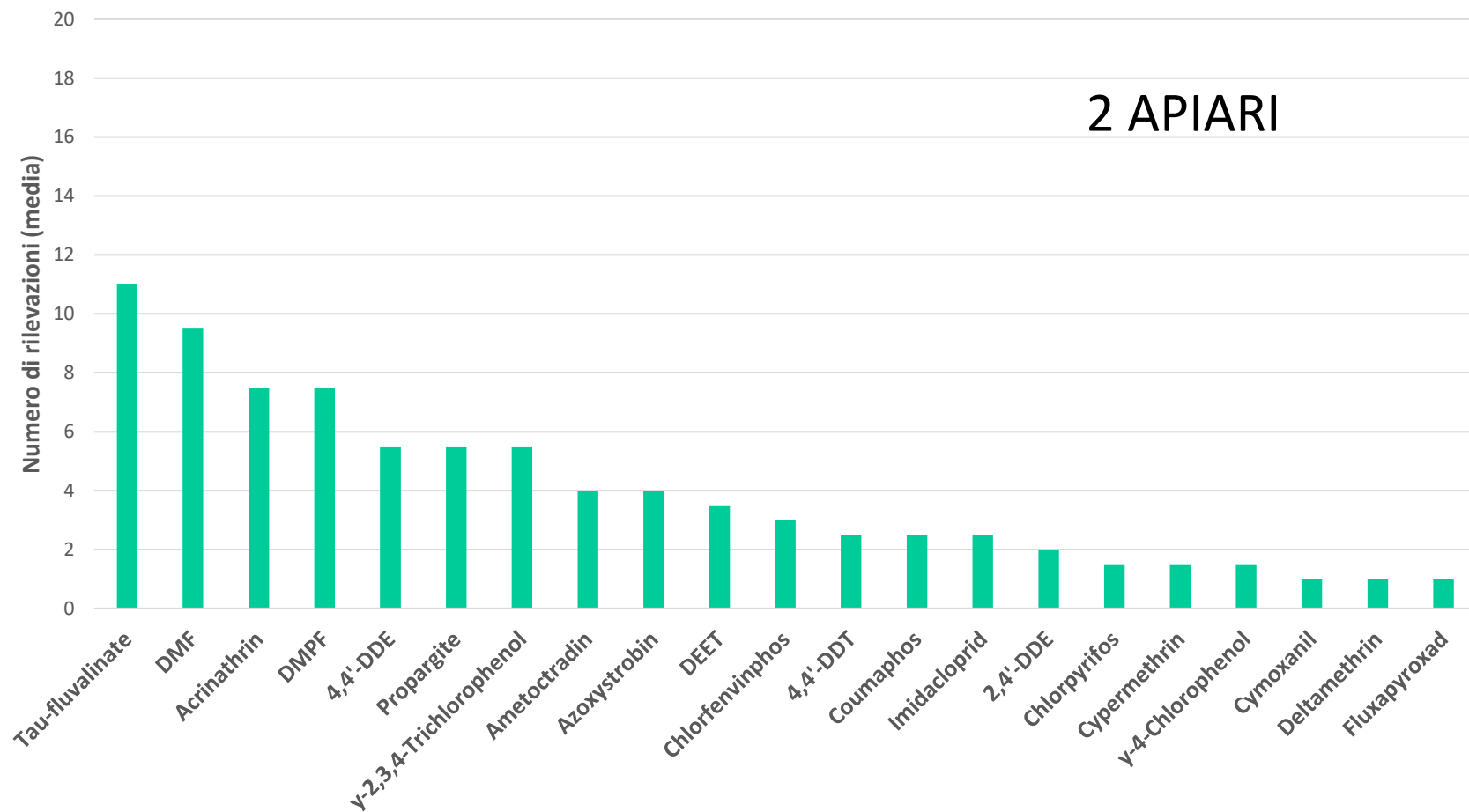
6 APIARI



Top 20 pesticidi zona

LOW AGRICULTURAL

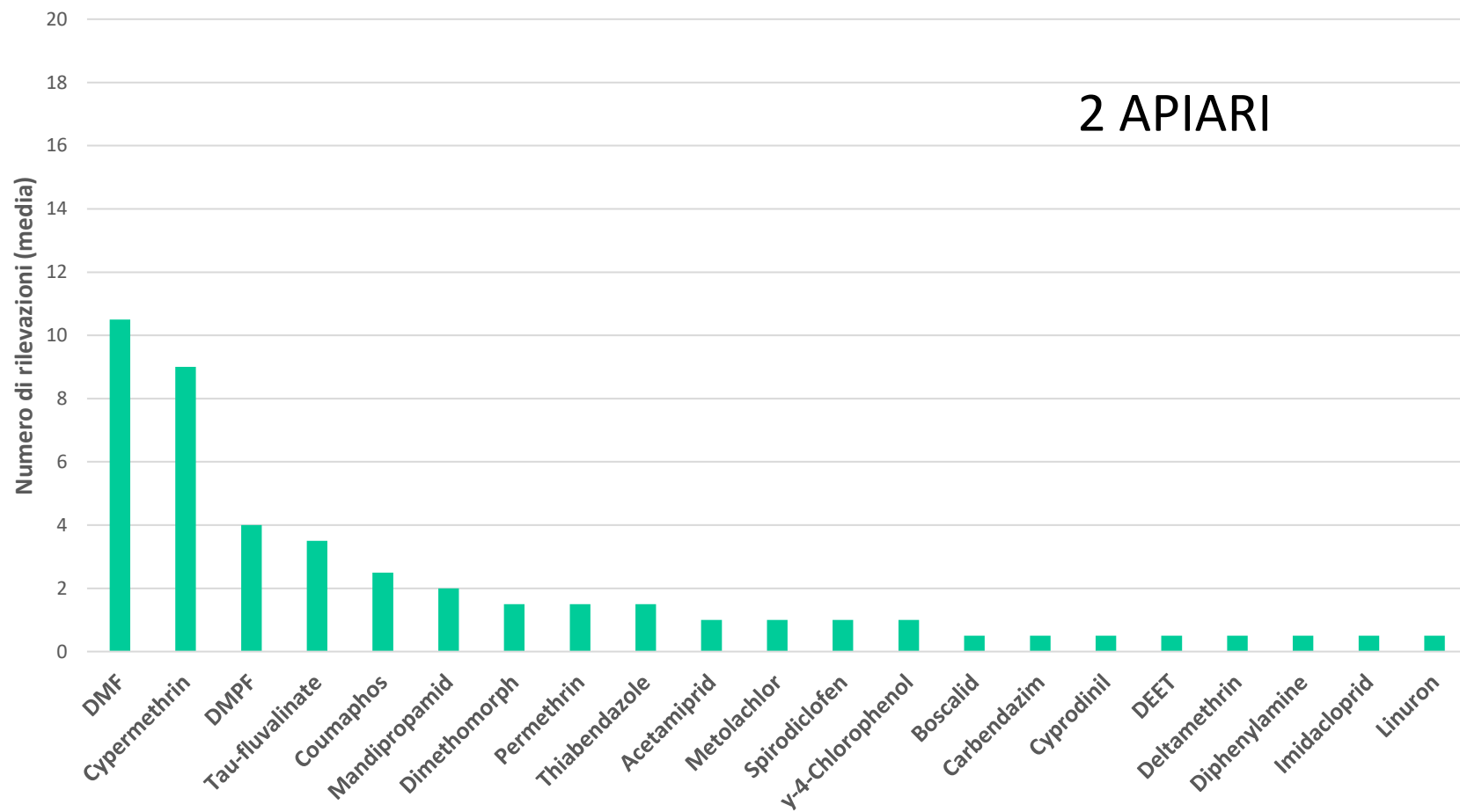
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Top 20 pesticidi zona

HIGH ARTIFICIAL

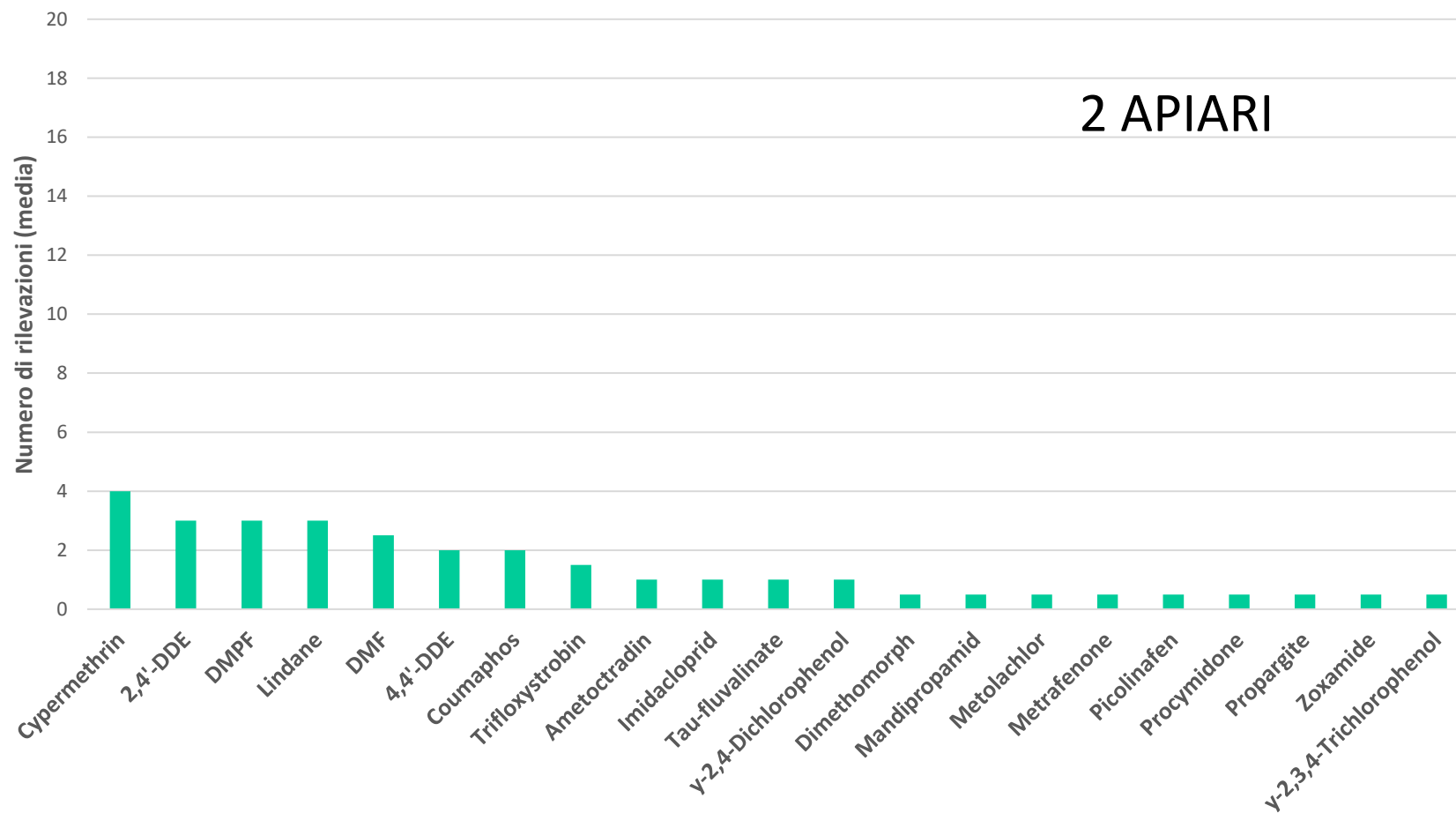
2 APIARI



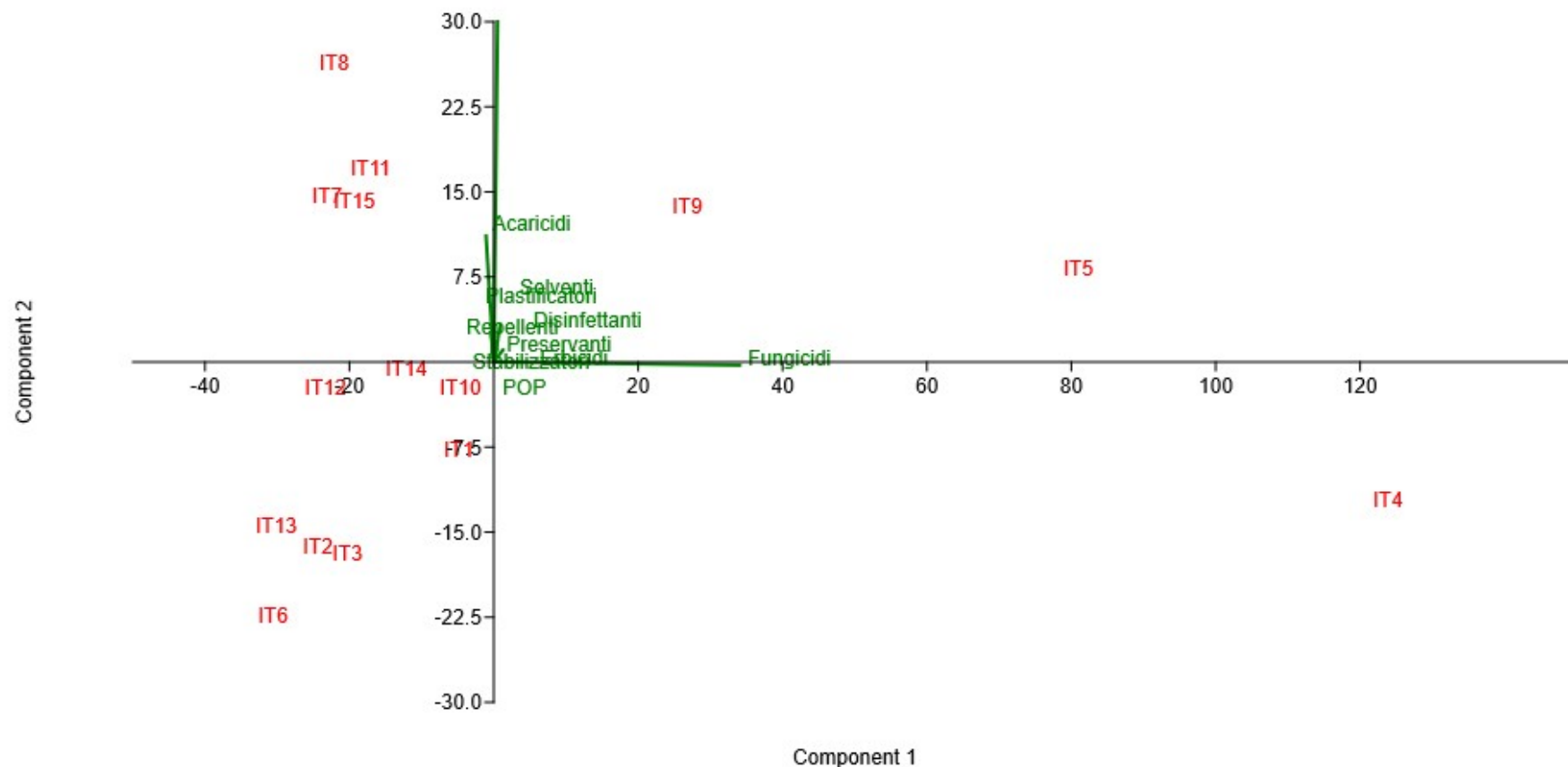
Top 20 pesticidi zona

MEDIUM NATURAL

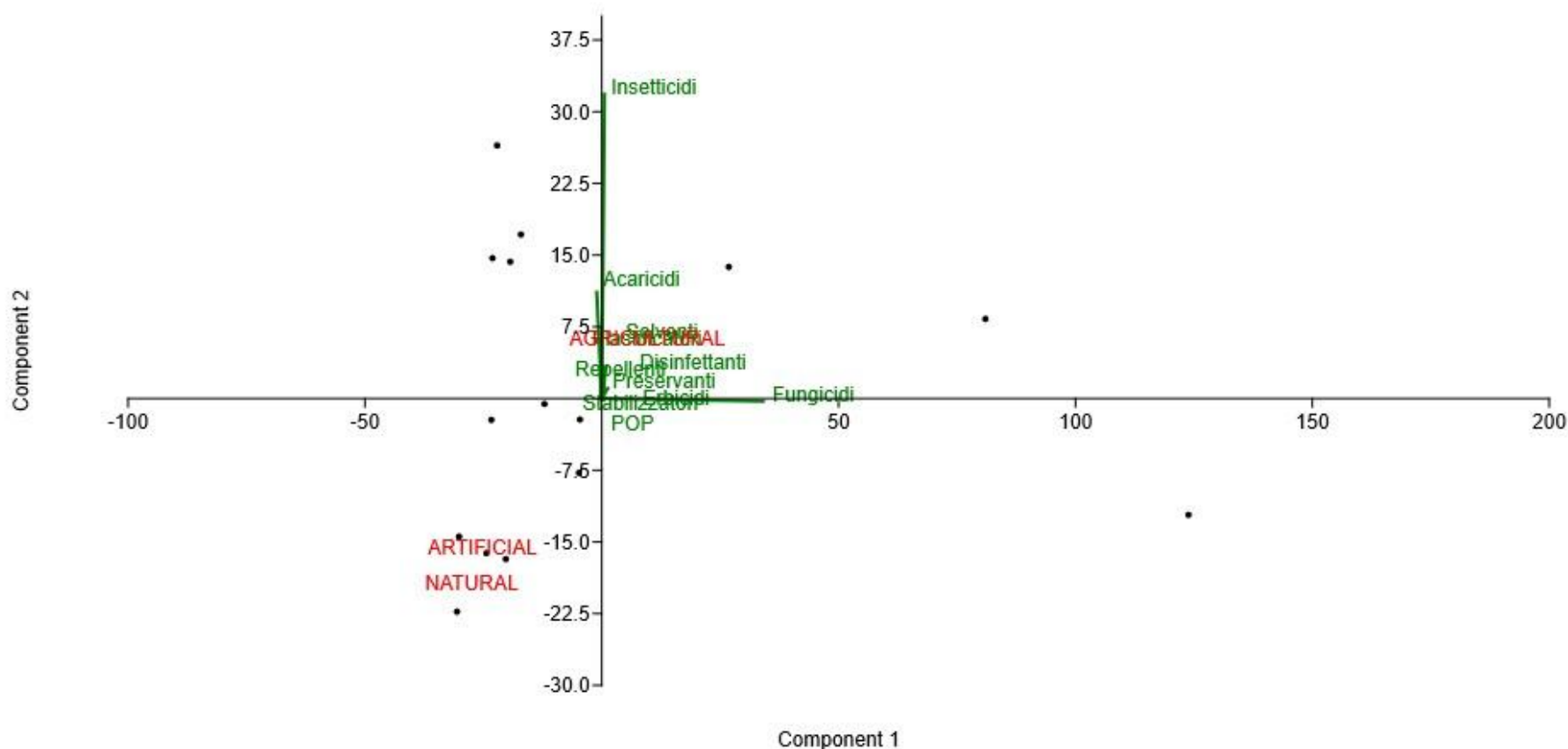
2 APIARI



PCA – Numero rinvenimenti divisi per tipologia per ogni area



PCA – Numero di rinvenimenti divisi per tipologia per ogni area

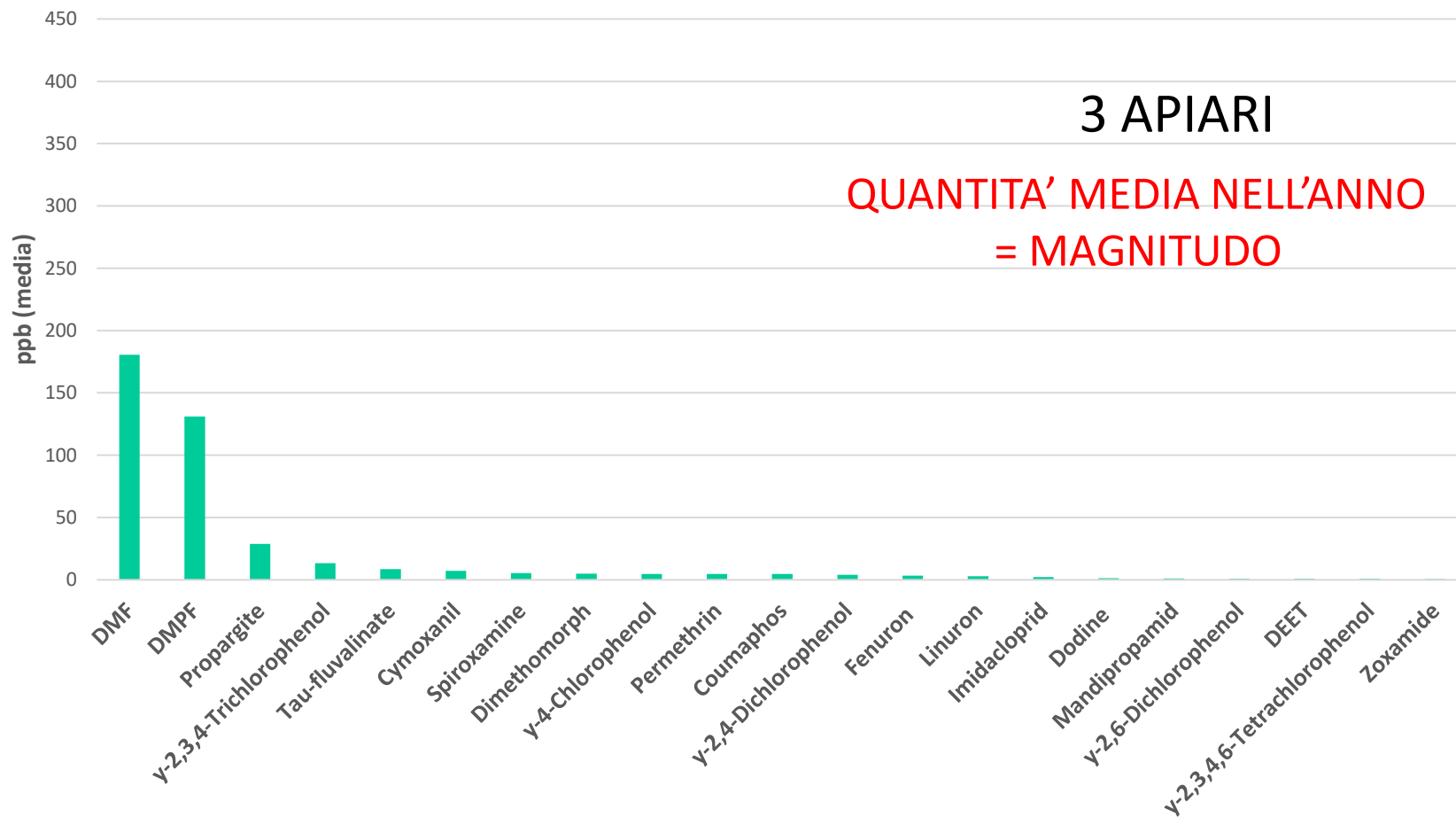


Top 20 pesticidi zona

HIGH AGRICULTURAL

3 APIARI

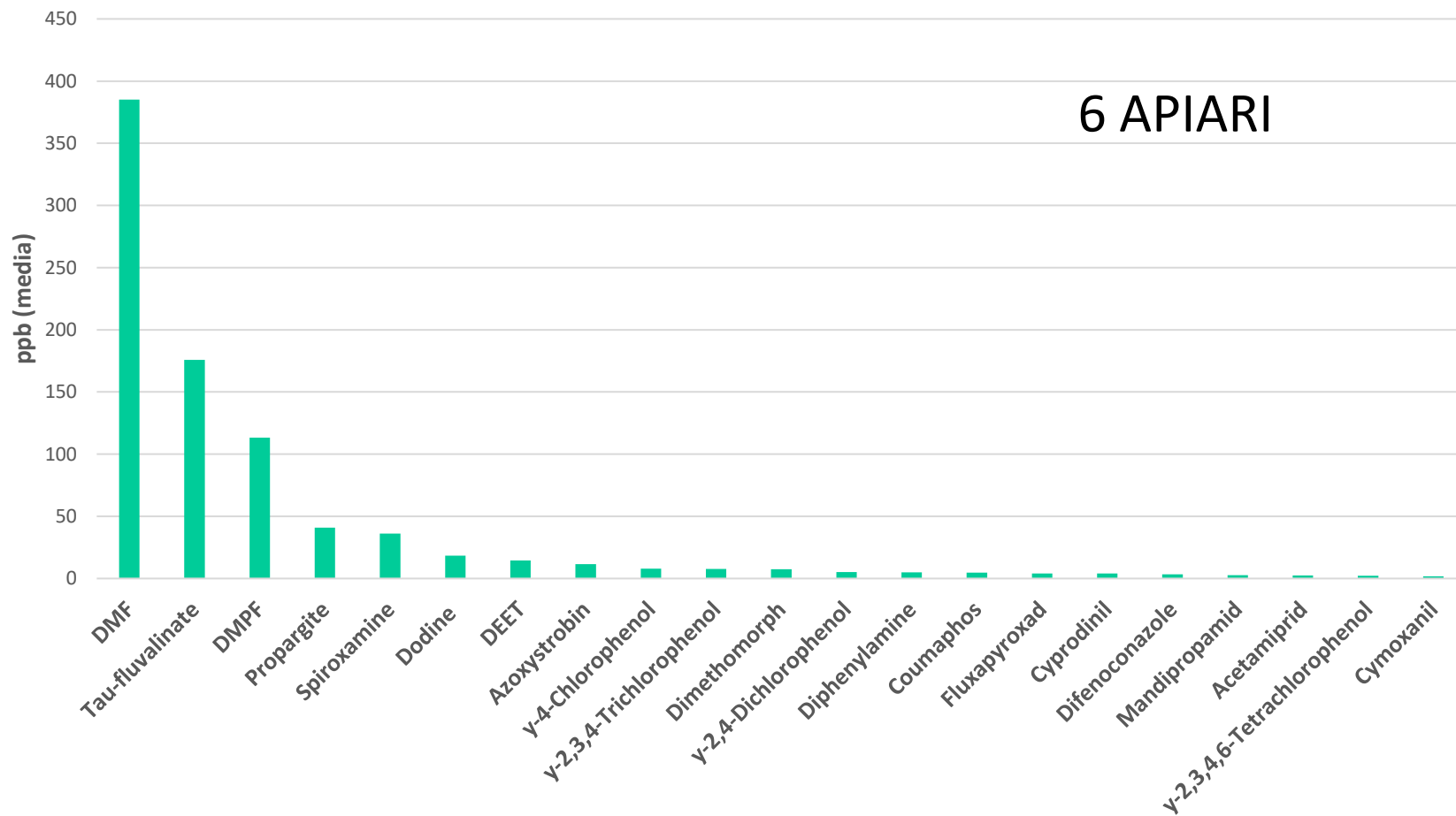
**QUANTITA' MEDIA NELL'ANNO
= MAGNITUDO**



Top 20 pesticidi zona

MEDIUM AGRICULTURAL

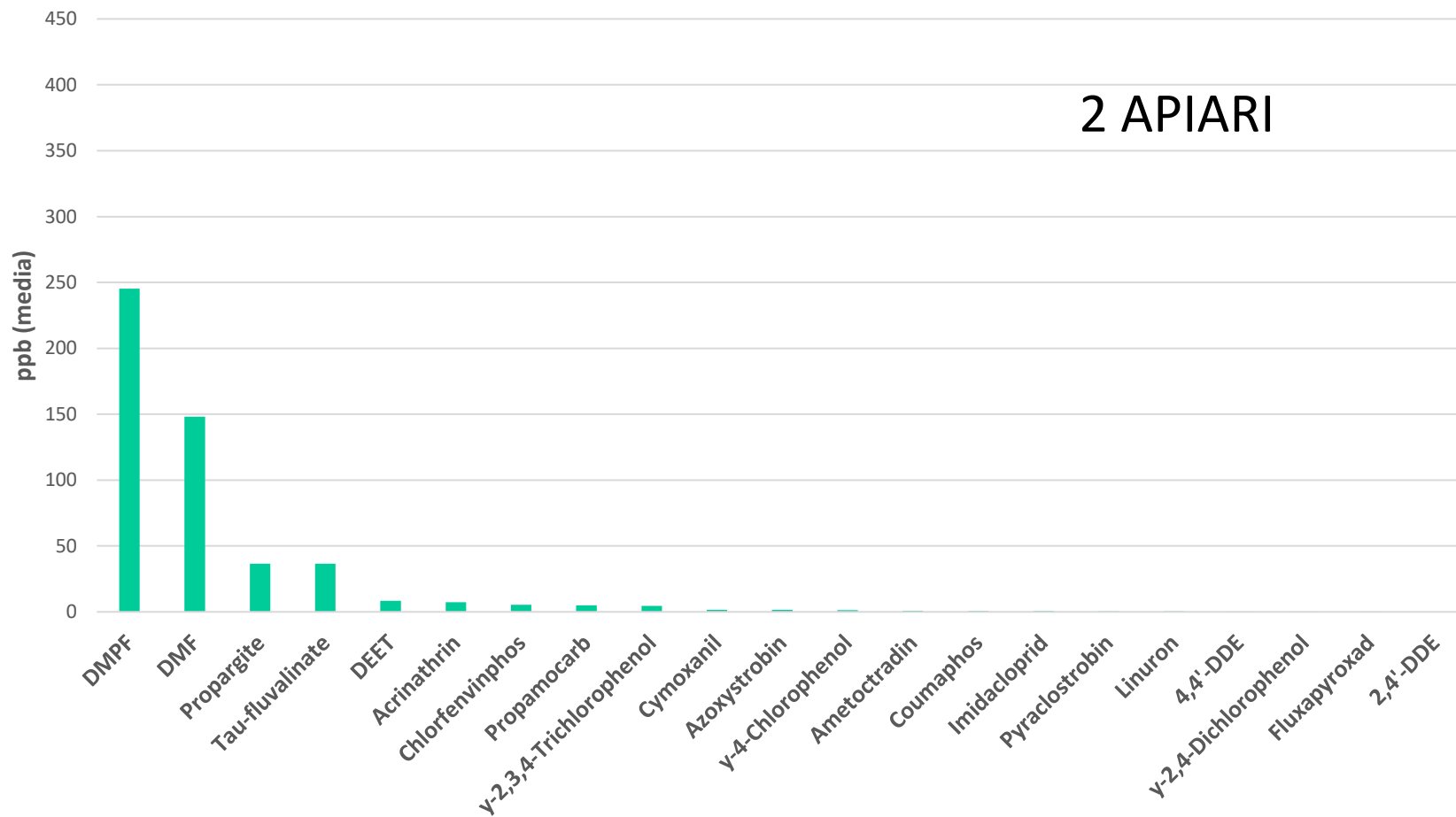
6 APIARI



Top 20 pesticidi zona

LOW AGRICULTURAL

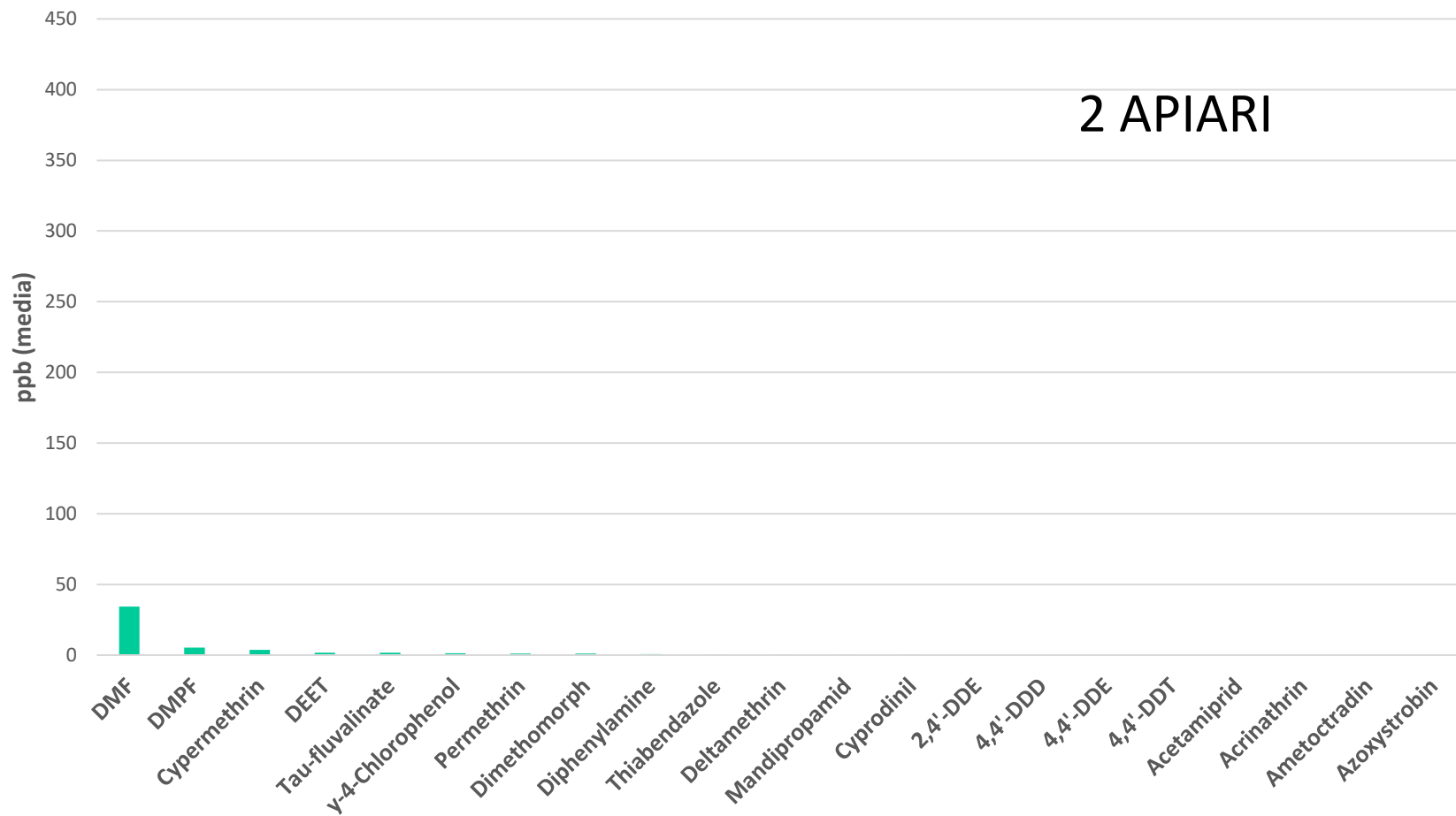
2 APIARI



Top 20 pesticidi zona

HIGH ARTIFICIAL

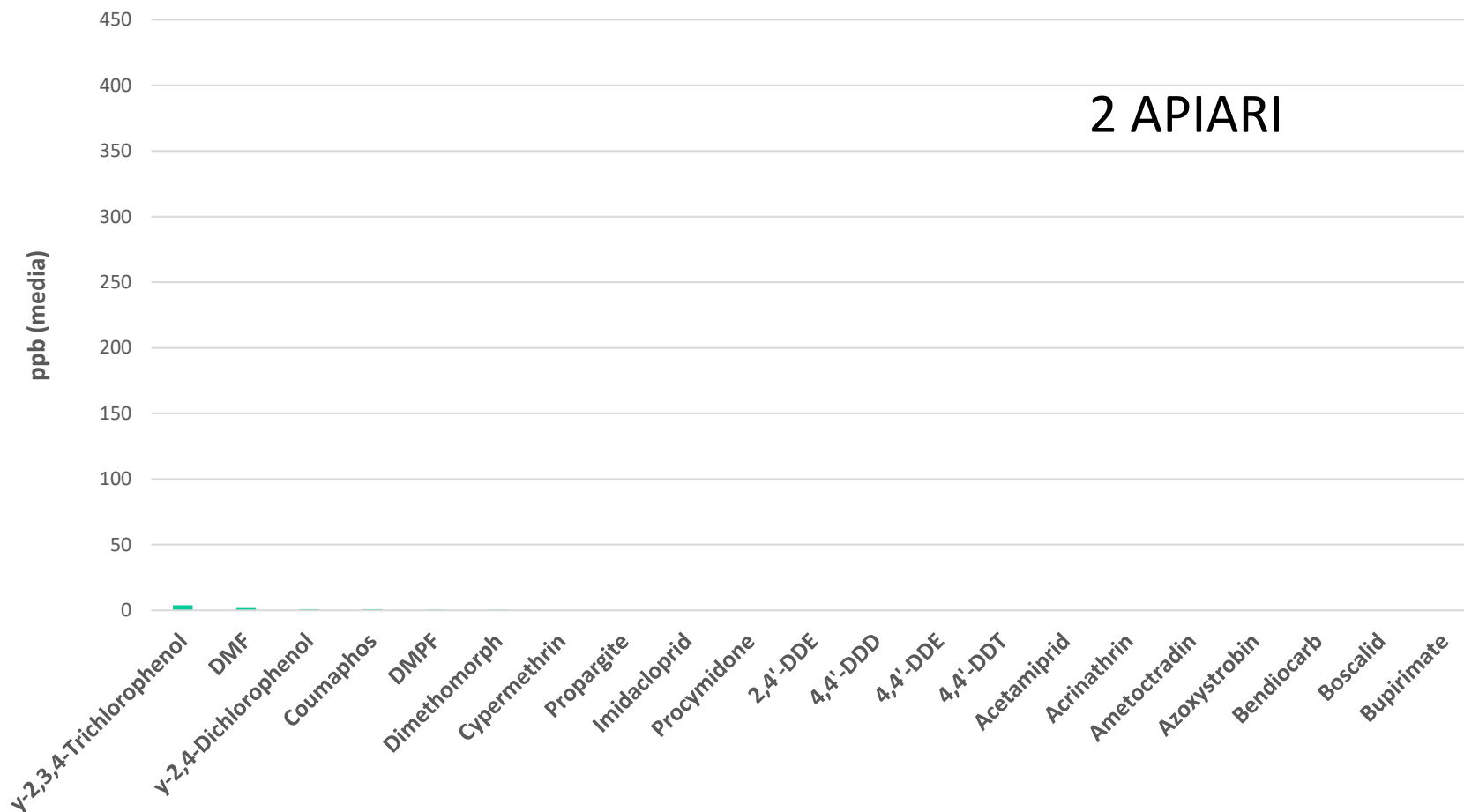
2 APIARI



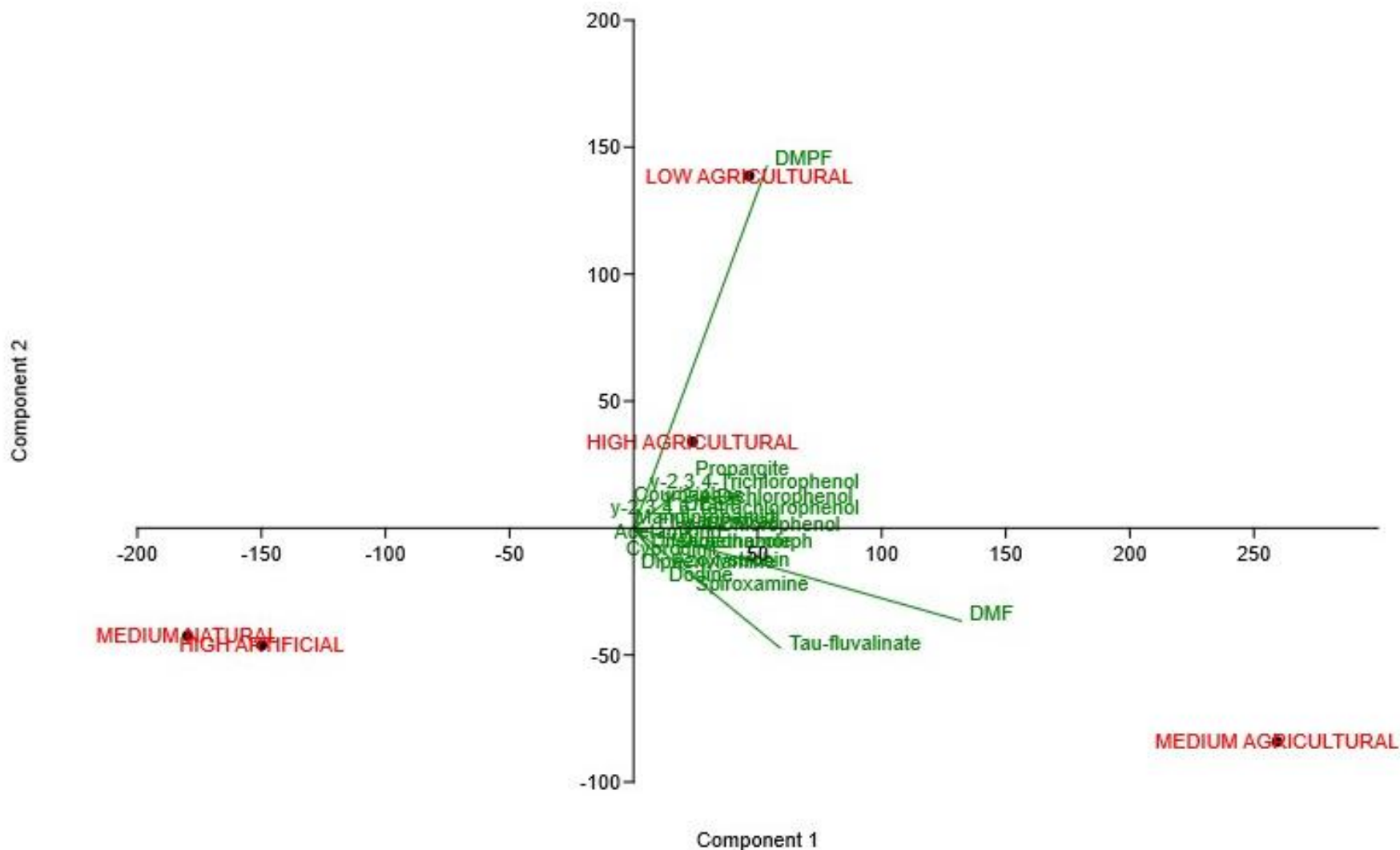
Top 20 pesticidi zona

MEDIUM NATURAL

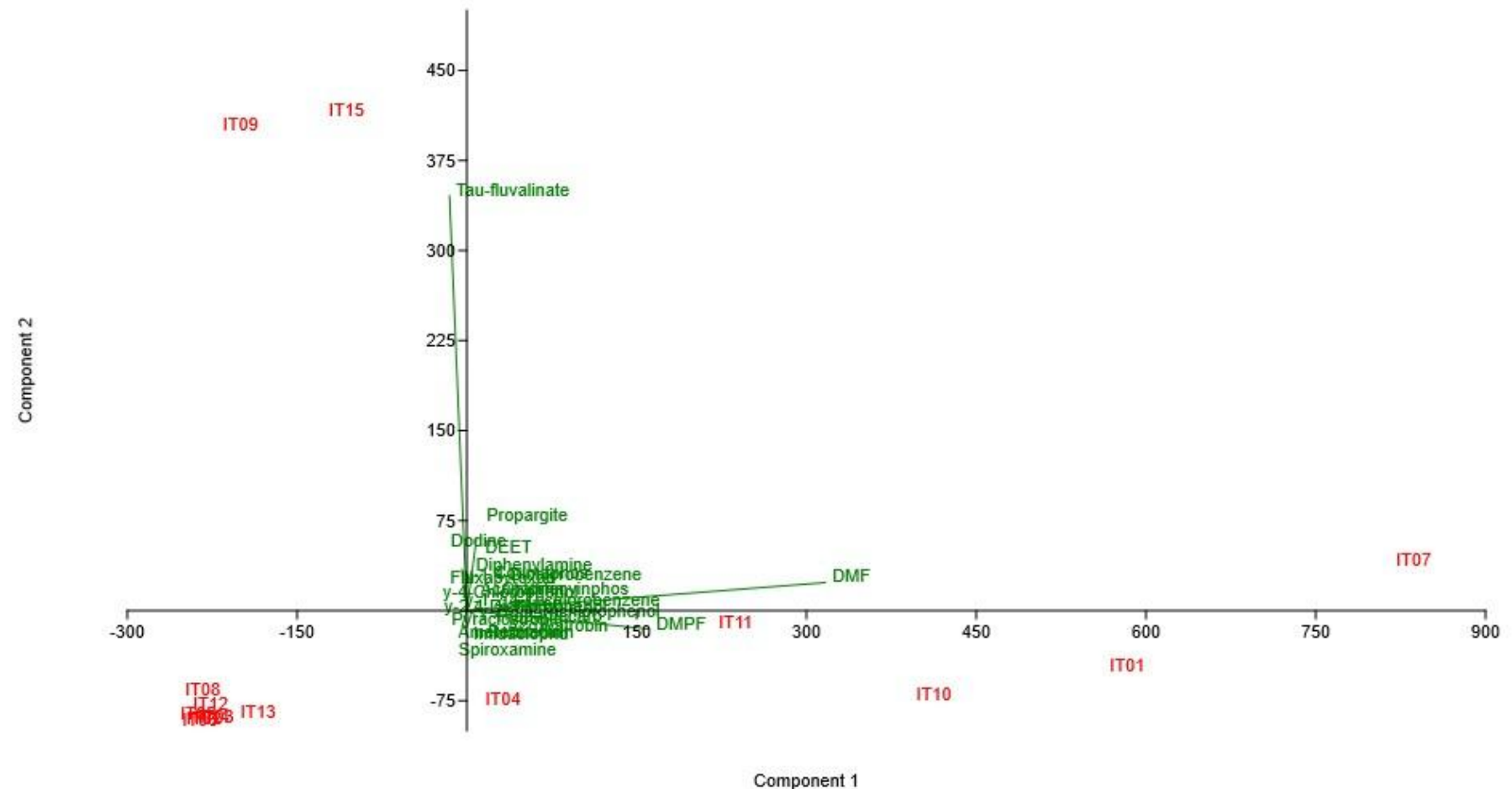
2 APIARI



PCA – Somma di tutti i pesticidi per ogni area



PCA – Somma dei pesticidi per ogni apicoltore



Conclusioni pesticidi

L'esposizione risulta sostanzialmente diversa in base alle zone

Alcuni pesticidi sono maggiormente usati in alcune aree (agricoltura/urbano) rispetto ad altre

Nelle zone naturali quantità complessive inferiori

Tali informazioni sono fondamentali per modellizzazione del rischio (WUR)



E gli altri pesticidi

Nei campioni di miele:

8 molecole ricercate
(idrofile)

Risultati espressi in ppb

Glyphosate

Ethephon

AMPA

Fosetyl Al

Glufosinate

Maleic Hydrazide

Phosphonic Acid

N-Acetyl_Glyphosate

LOQS	(ng/g)
Glyphosate	10
AMPA	10
Glufosinate	20
Phosphonic Acid	10
Ethephon	10
Fosetyl Al	10
Maleic Hydrazide	20
N-Acetyl-Glyphosate	20



Risultati pesticidi polari

1 solo campione di miele positivo

18ppb (IT02)

SR08 – 10/13 agosto



VOC (Composti Organici Volatili) e IPA (Idrocarburi Policiclici Aromatici)

Nei bracciali di silicone:

19 VOC ricercati

32 IPA ricercati

Risultati espressi in ppb

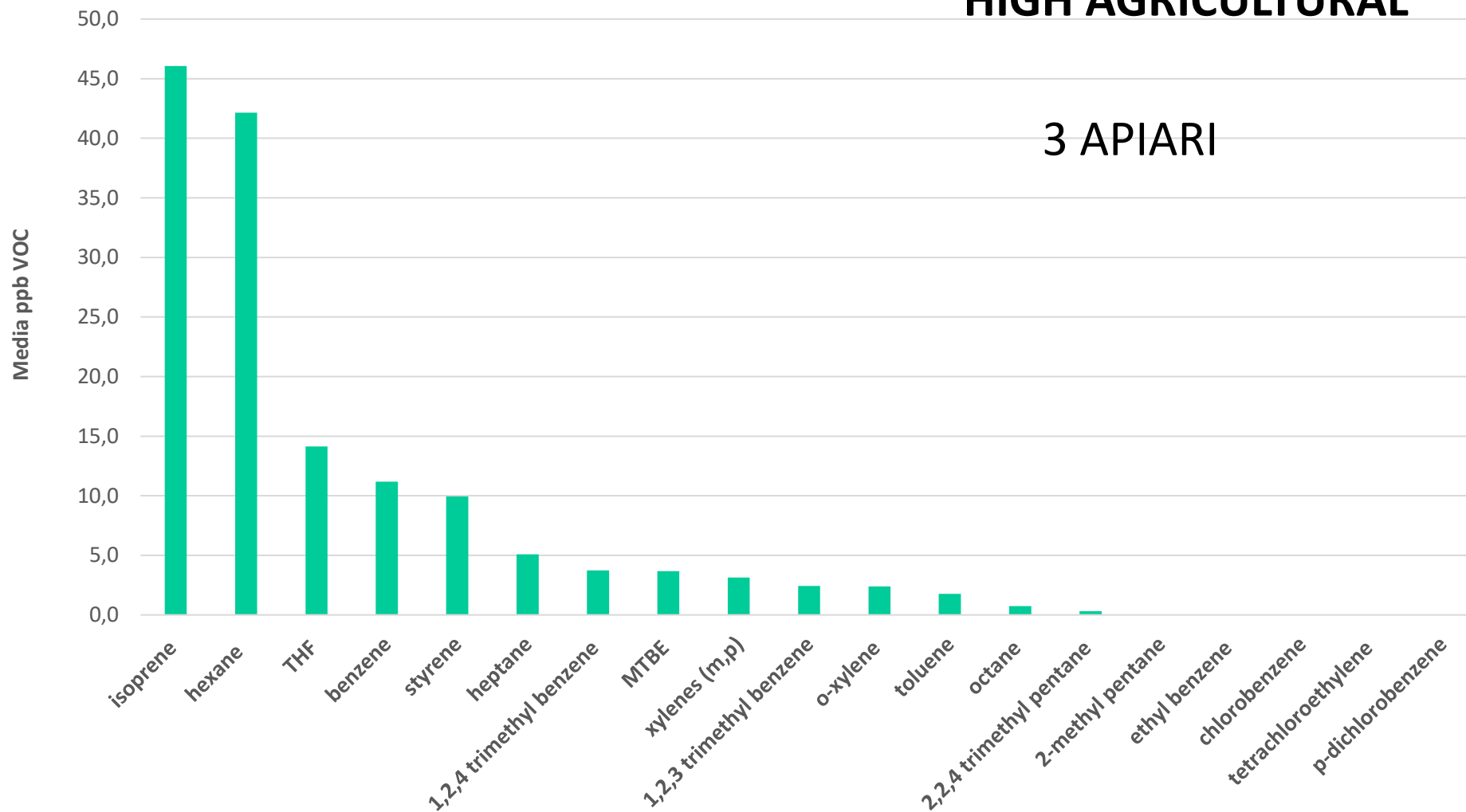


Analyte	LOQ (ng/g)	Analyte	LOQ (ng/g)
isoprene	0,1	Naphthalene	0,5
2methyl pentane	0,1	1-Methyl-naphthalene	0,5
hexane	0,2	2-Methyl naphthalene	0,5
MTBE	0,4	1,4-Naphthoquinone	0,1
benzene	0,1	1,4-Dimethylnaphthalene	0,5
2,2,4 trimethyl pentane	0,2	Acenaphthene	0,5
octane	0,2	Fluorene	0,5
toluene	0,4	1-Nitronaphthalene	5
tetrachloroethylene	1	2-Methyl-1-nitronaphthalene	5
chlorobenzene	1	9,10-Dihydroanthracene	1
o-xylene	0,2	9-Fluorenone	0,2
xylene (m,p)	0,1	Phenanthrene	0,1
heptane	0,5	Anthracene	0,5
styrene	0,1	1-Methoxy-4-nitronaphthalene	1
1,2,4-trimethyl benzene	0,2	Fluoranthene	0,5
1,2,3-trimethyl benzene	0,2	Pyrene	0,5
p-dichlorobenzene	1	9nitroanthracene	2
ethyl benzene	0,5	1,8 dinitronaphthalene	1
		2-nitro-fluorenone	1
		benzo(a)fluorenone	1
		Benzo(a)anthracene	1
		11HBenzo[b]fluorene11one	5
		Chrysene	1
		1-Nitropyrene	1
		5,12-naphthacenoquinone	5
		Benzo(b,k,j)fluoranthene	0,5
		Benzo(a)pyrene	1
		Benzo(e)pyrene	1
		6Hbenzo[cd]pyrenone	2
		Indeno(1,2,3cd)pyrene	1
		Dibenzo(a,h)anthracene	0,5
		6Nitrobenzo[a]pyrene	5
		Benzo(g,h,i)perylene	1

VOC

HIGH AGRICULTURAL

3 APIARI

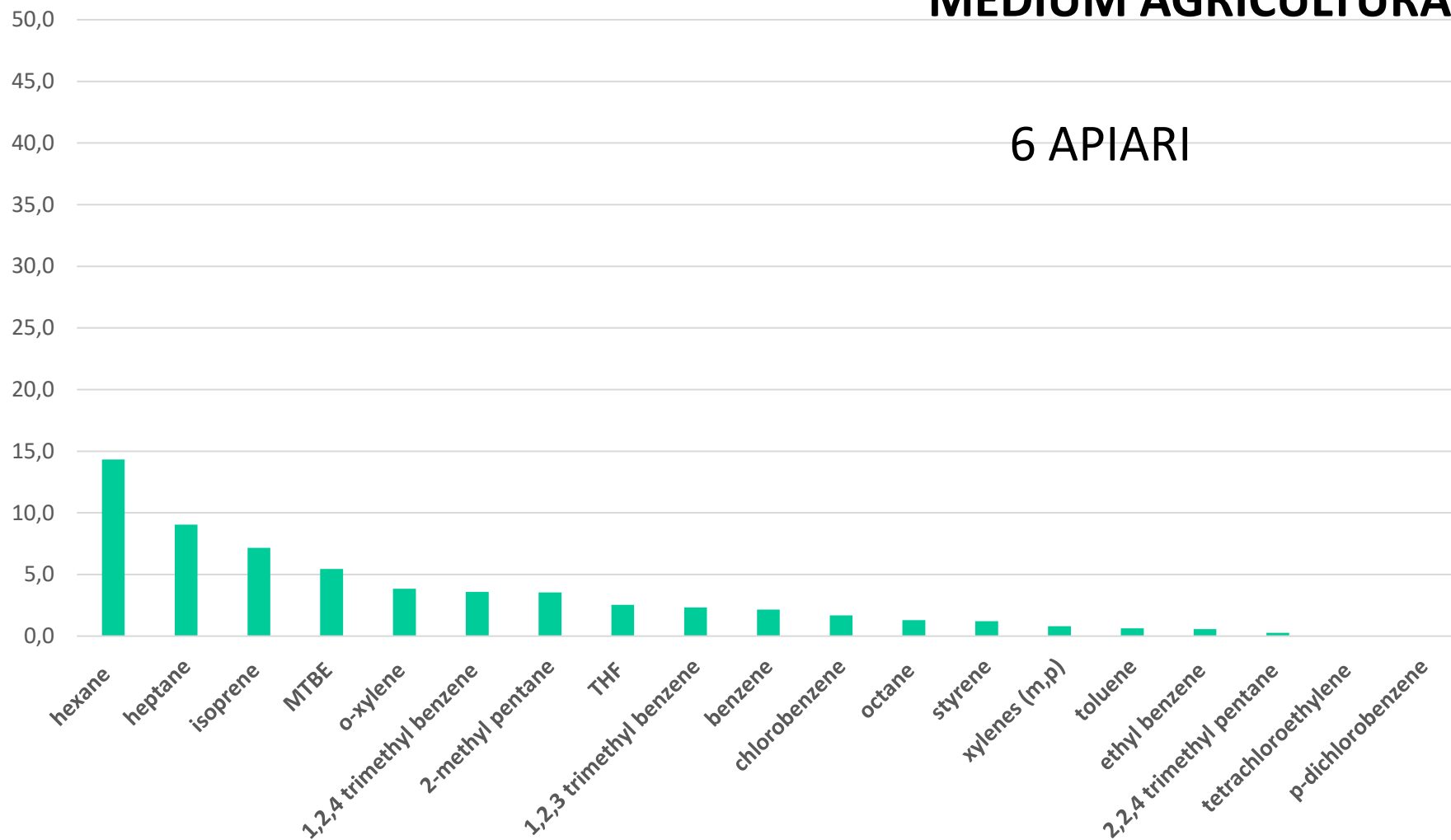


VOC

MEDIUM AGRICULTURAL

6 APIARI

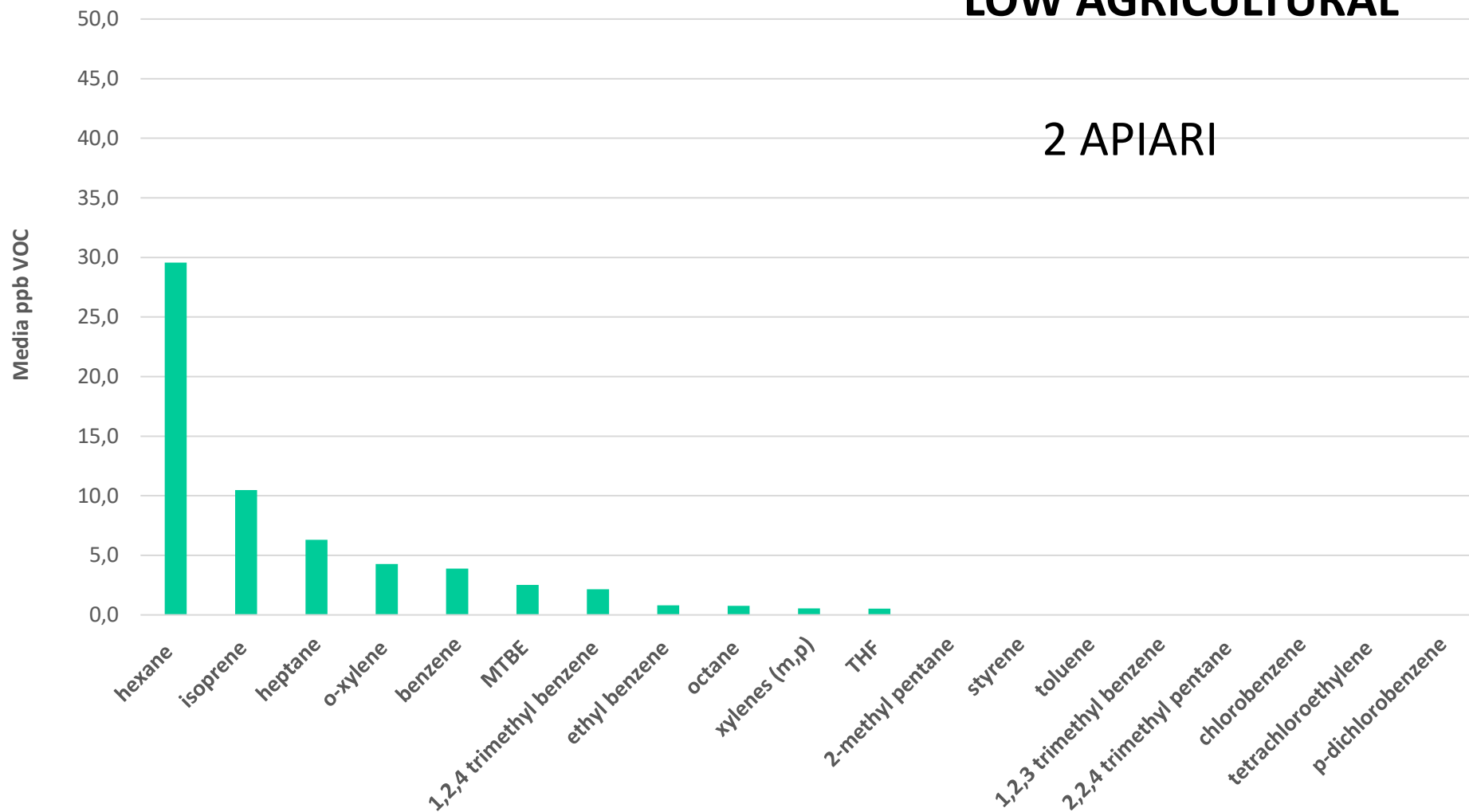
Media ppb VOC



VOC

LOW AGRICULTURAL

2 APIARI

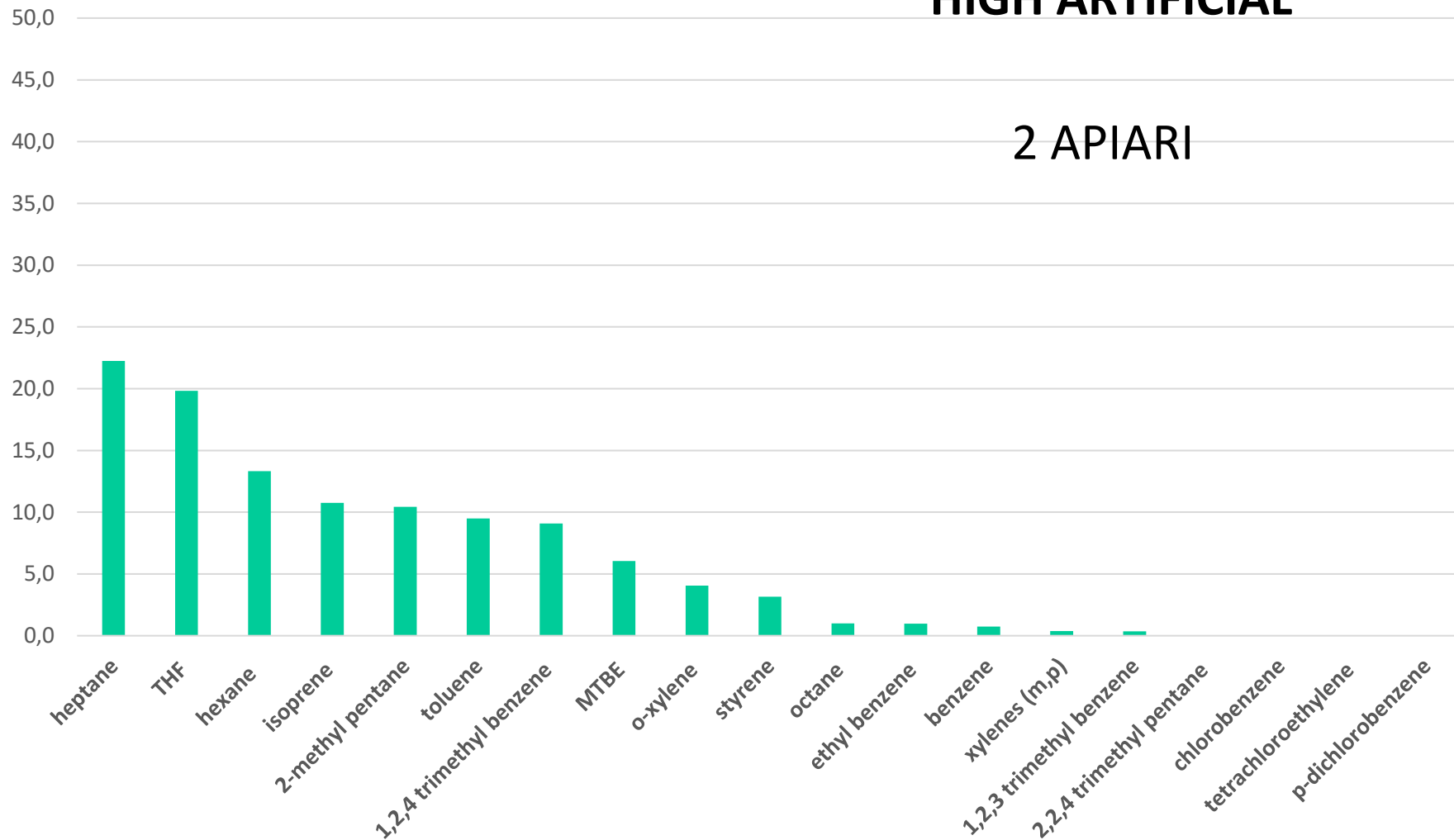


VOC

HIGH ARTIFICIAL

2 APIARI

Media ppb VOC

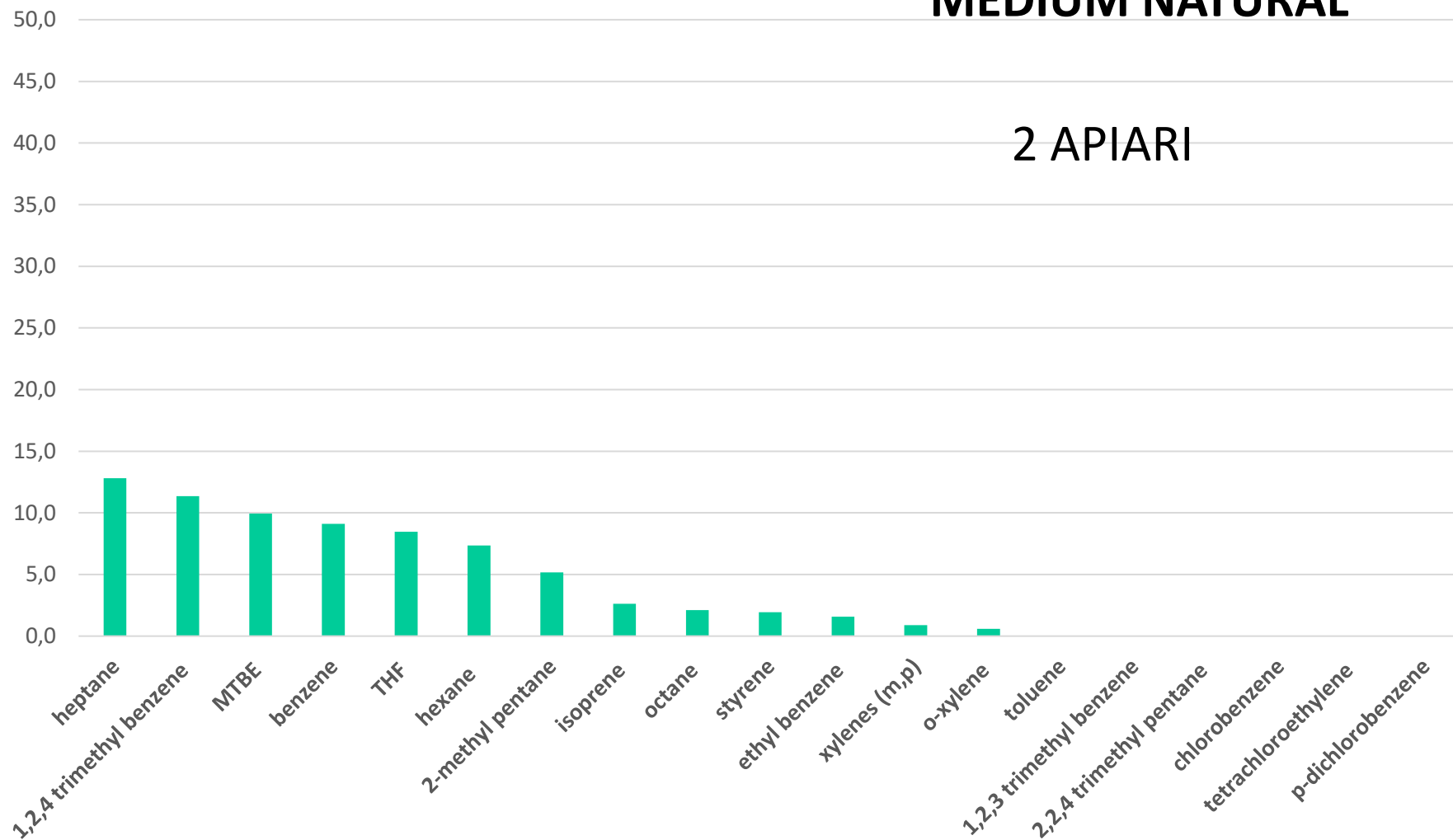


VOC

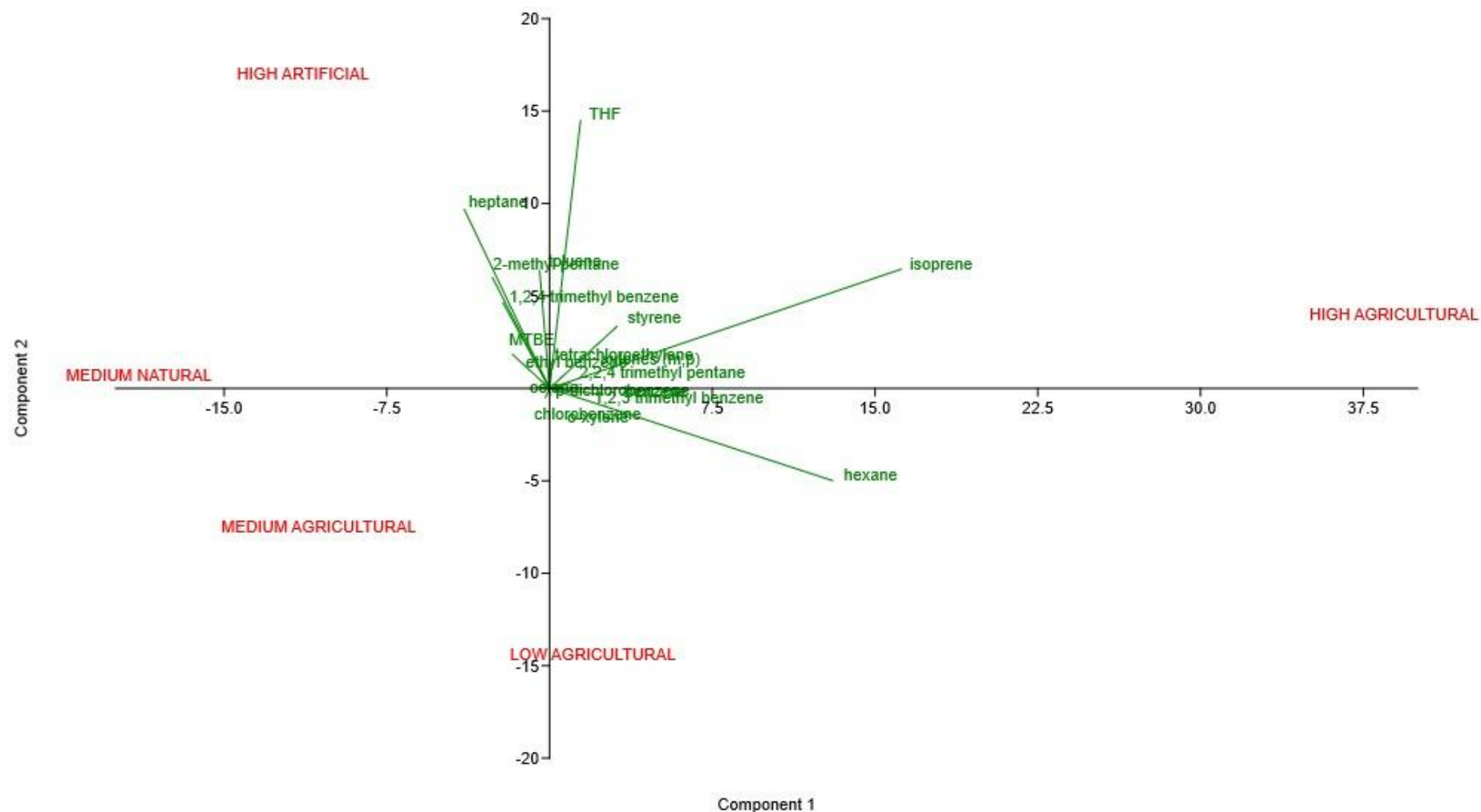
MEDIUM NATURAL

2 APIARI

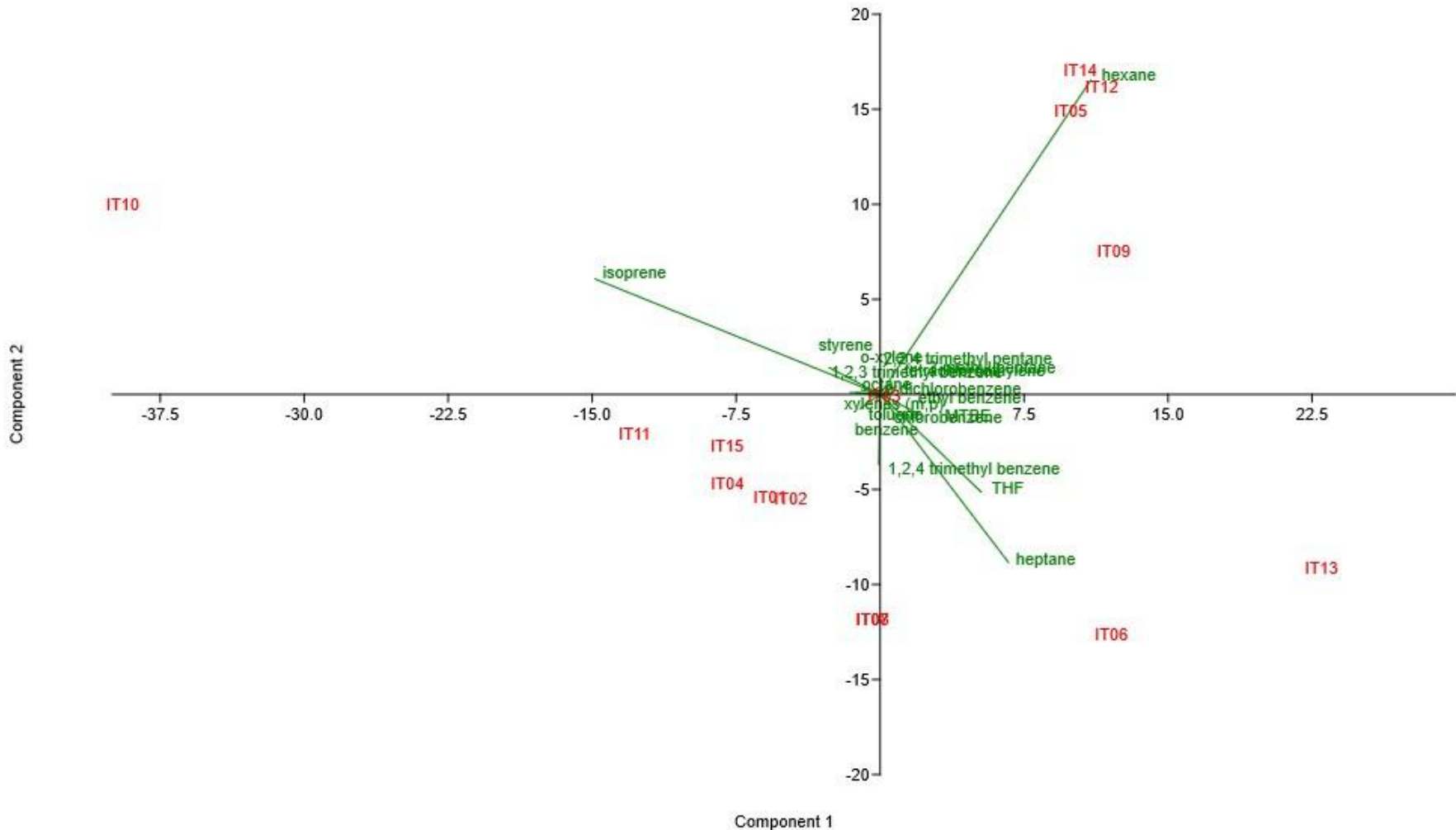
Media ppb VOC



PCA – Media VOC per ogni area



PCA – Media VOC per ogni apiario



Risultati VOC

Quasi tutti i VOC sono «ubiquitari»

Tetrachloroethylene (mai rinvenuto), chlorobenzene (1 pos, molti <LOQ), p-dichlorobenzene (uno solo <LOQ)

Cambia la tipologia di VOC in base all'ambiente (origine antropica)

Modelizzazione dati fondamentale

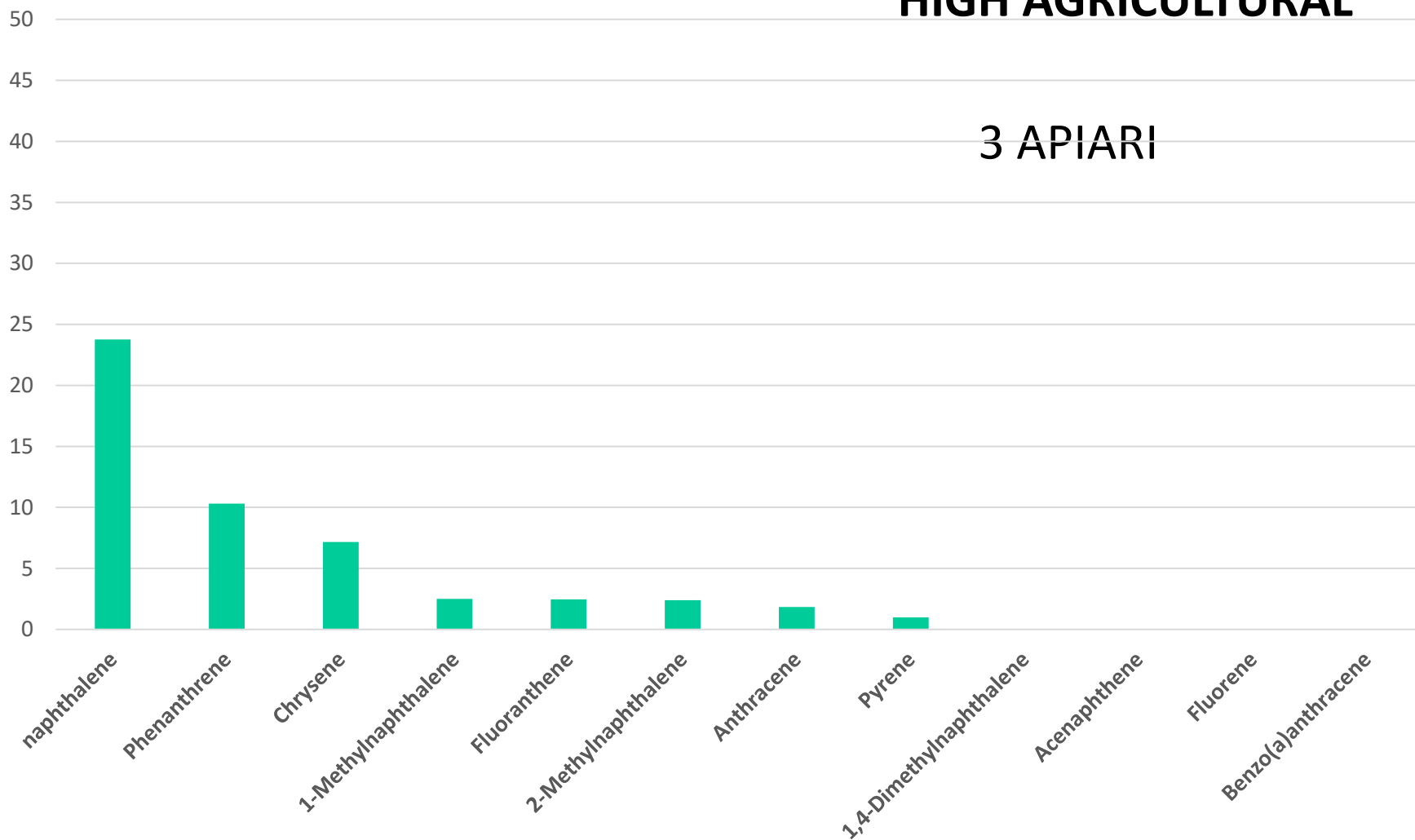


IPA

HIGH AGRICULTURAL

3 APIARI

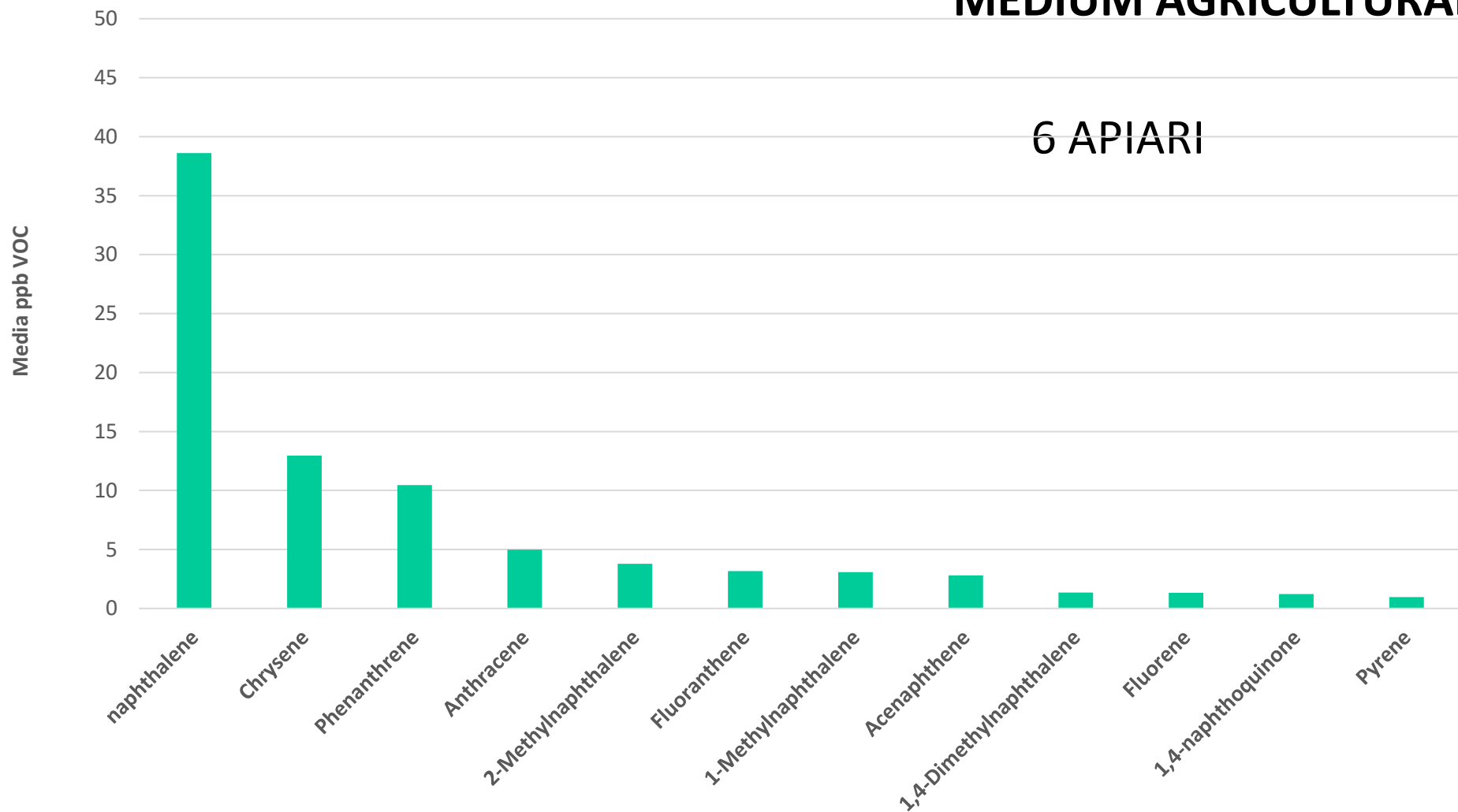
Media ppb VOC



IPA

MEDIUM AGRICULTURAL

6 APIARI

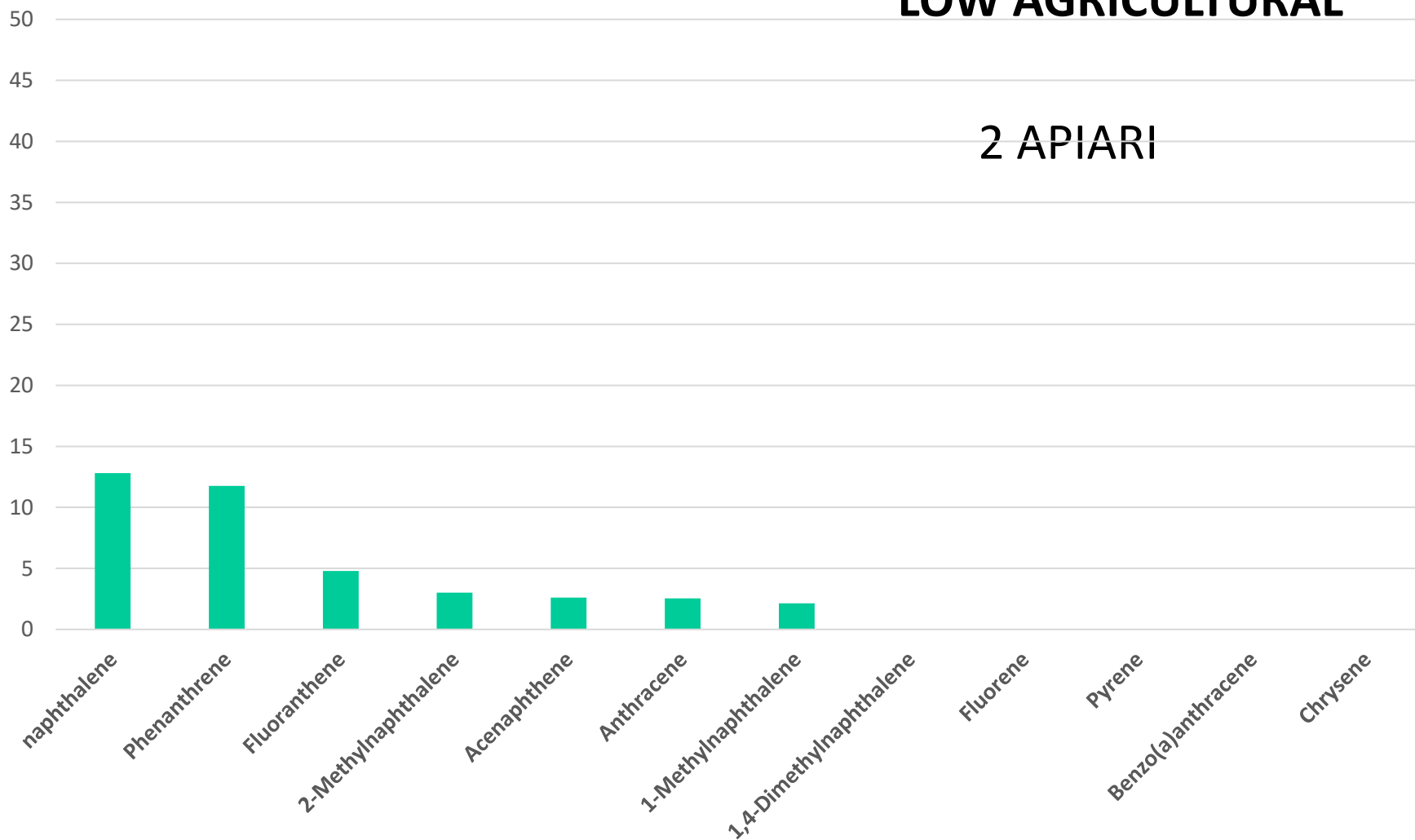


IPA

LOW AGRICULTURAL

2 APIARI

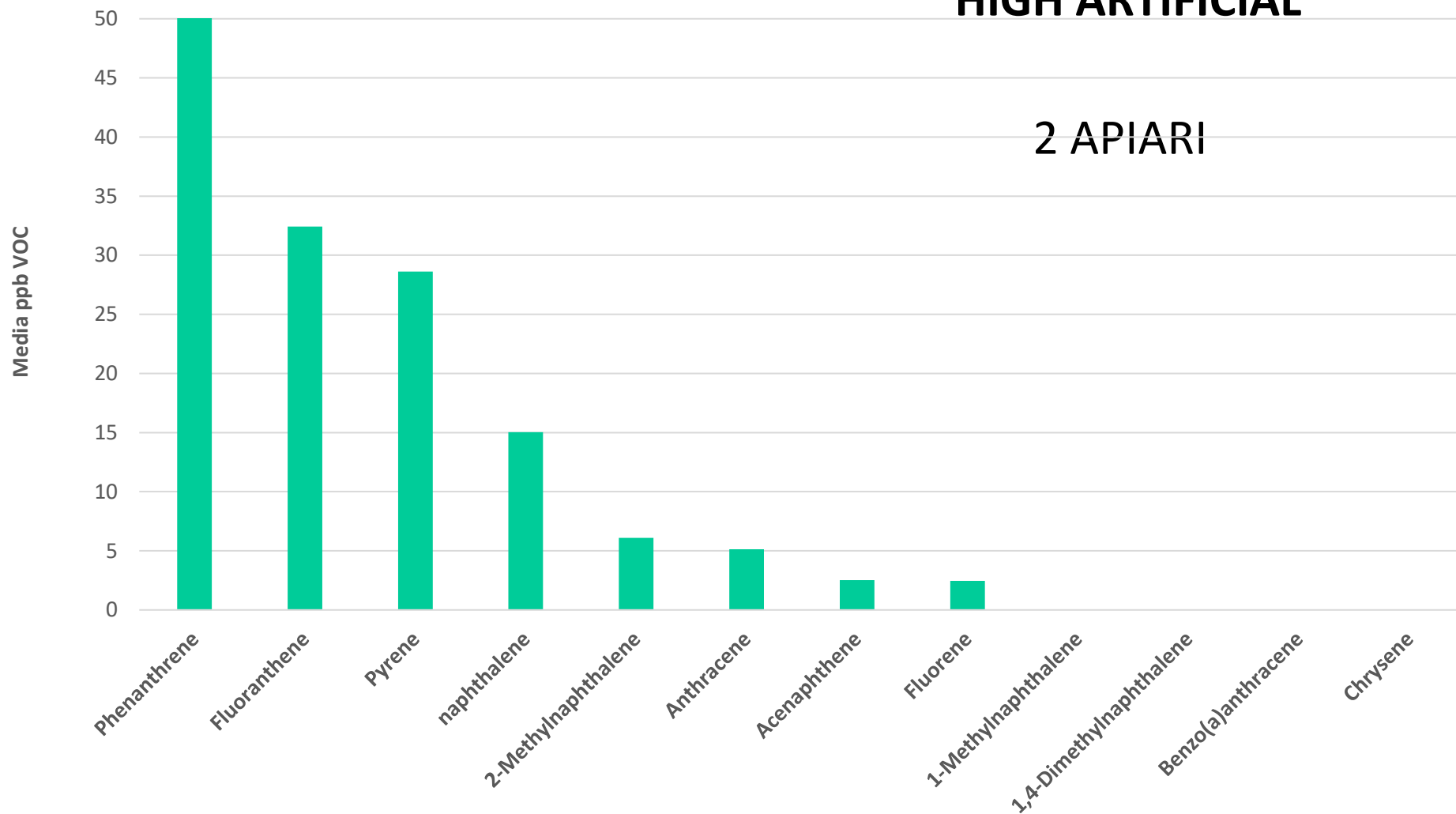
Media ppb VOC



IPA

HIGH ARTIFICIAL

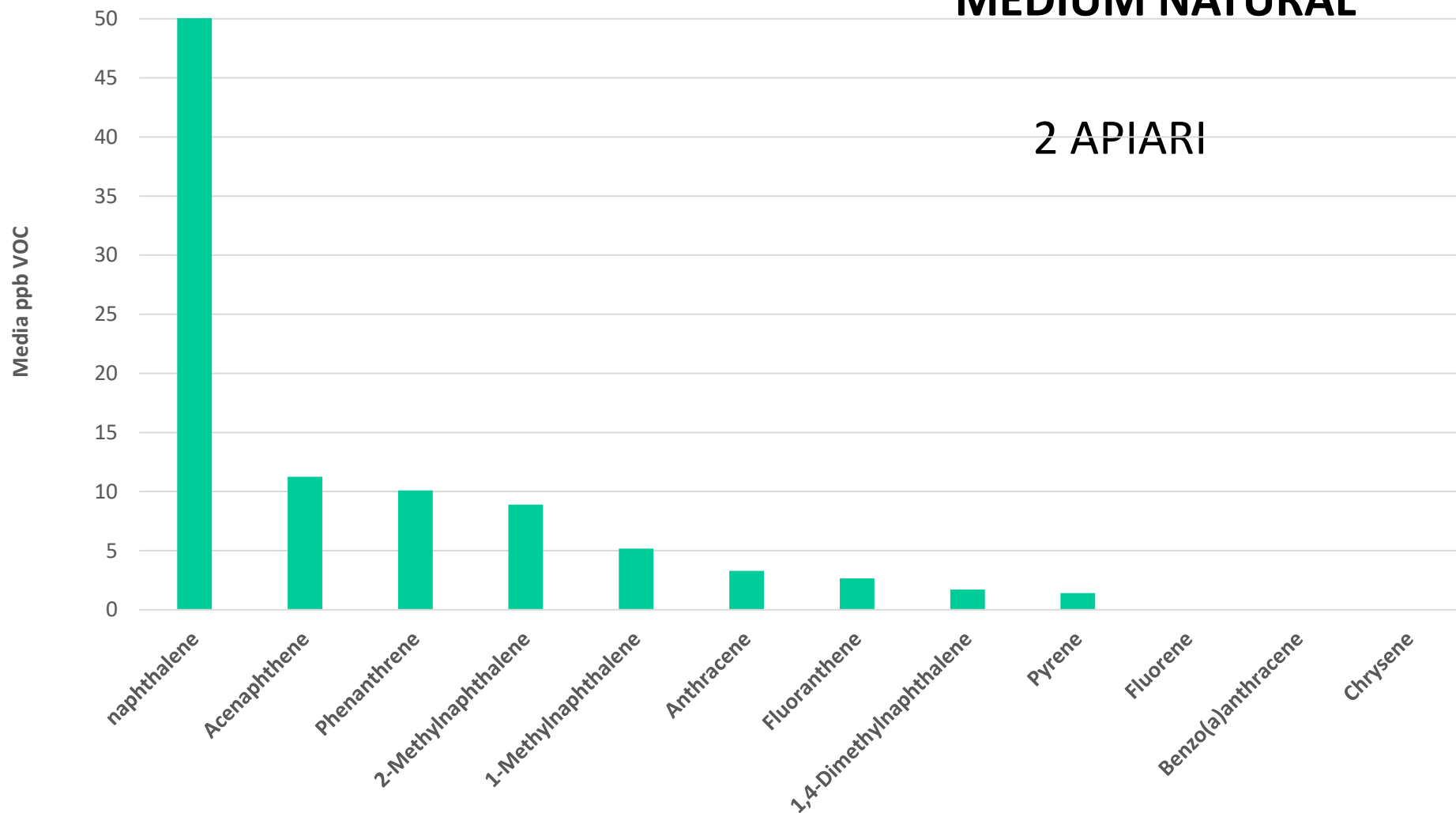
2 APIARI



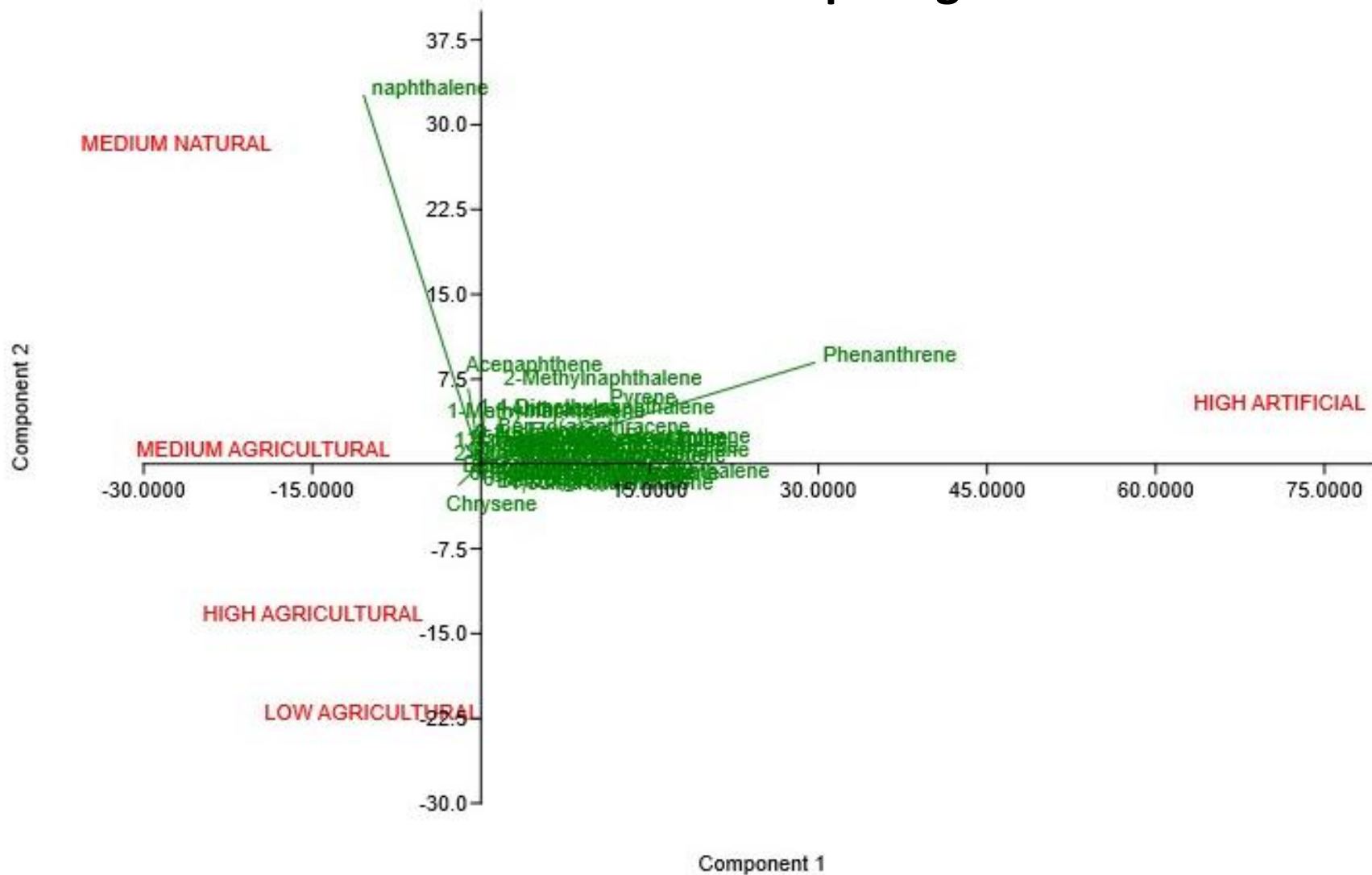
IPA

MEDIUM NATURAL

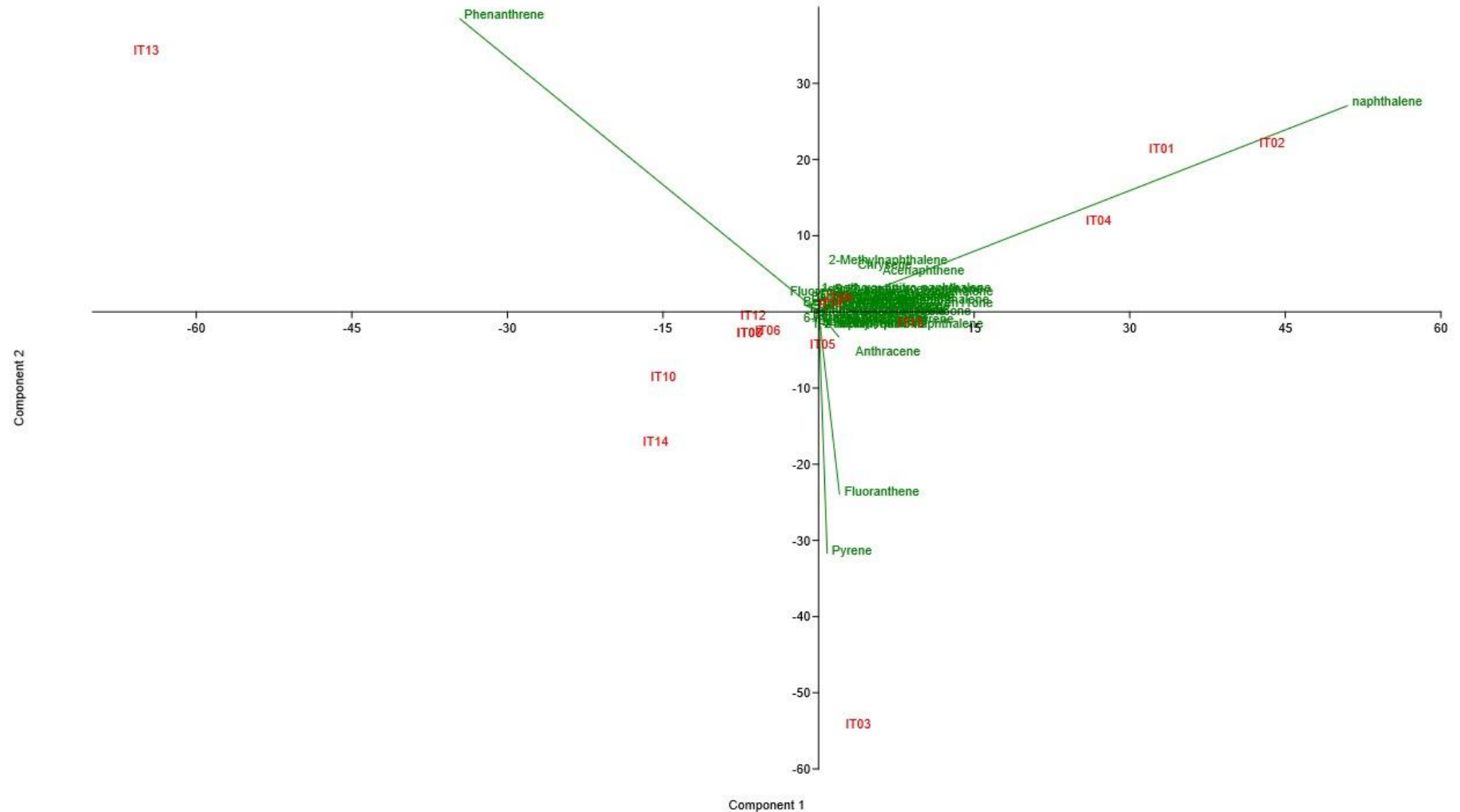
2 APIARI



PCA – Media IPA per ogni area



PCA – Media IPA per ogni apiario



Risultati IPA

25 dei 32 IPA sono risultati quasi sempre assenti

Phenantrene e Fluoranthene emergono nelle aree
«artificiali/urbane» rispetto al naftalene

Modellizzazione dati - hotspot



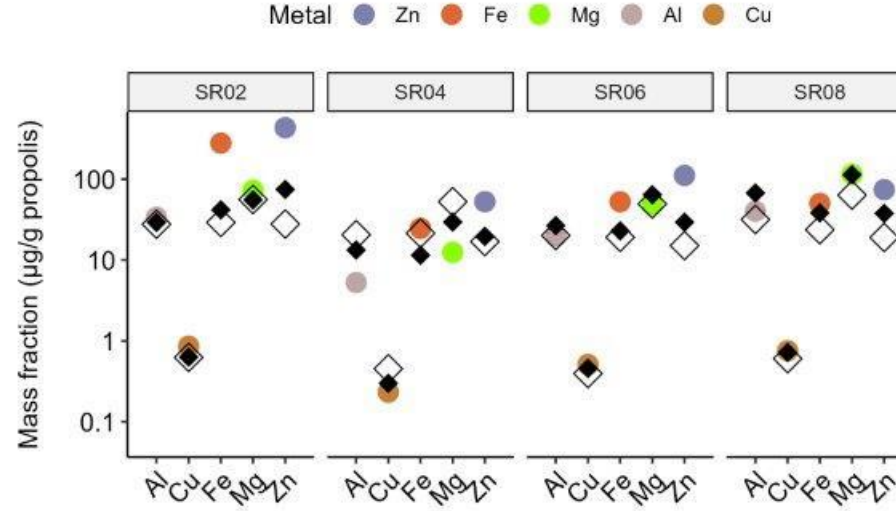
Metalli pesanti

Metalli sono ubiquitari nell'ambiente

Ricercati:

- Alluminio (Al)
- Rame (Cu)
- Ferro (Fe)
- Magnesio (Mg)
- Zinco (Zn)
- Arsenico (As)
- Cobalto (Co)
- Cromo (Cr)
- Nichel (Ni)
- Piombo (Pb)
- Selenio (Se)

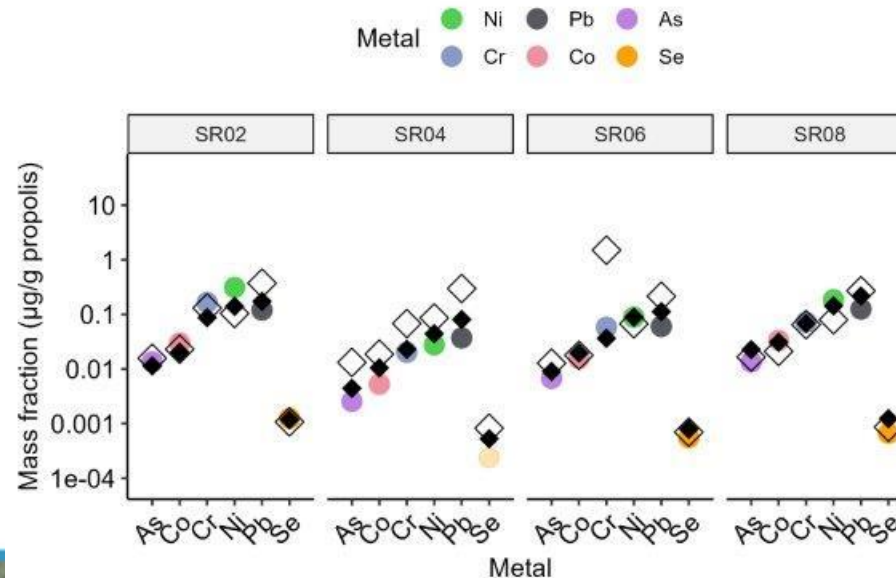


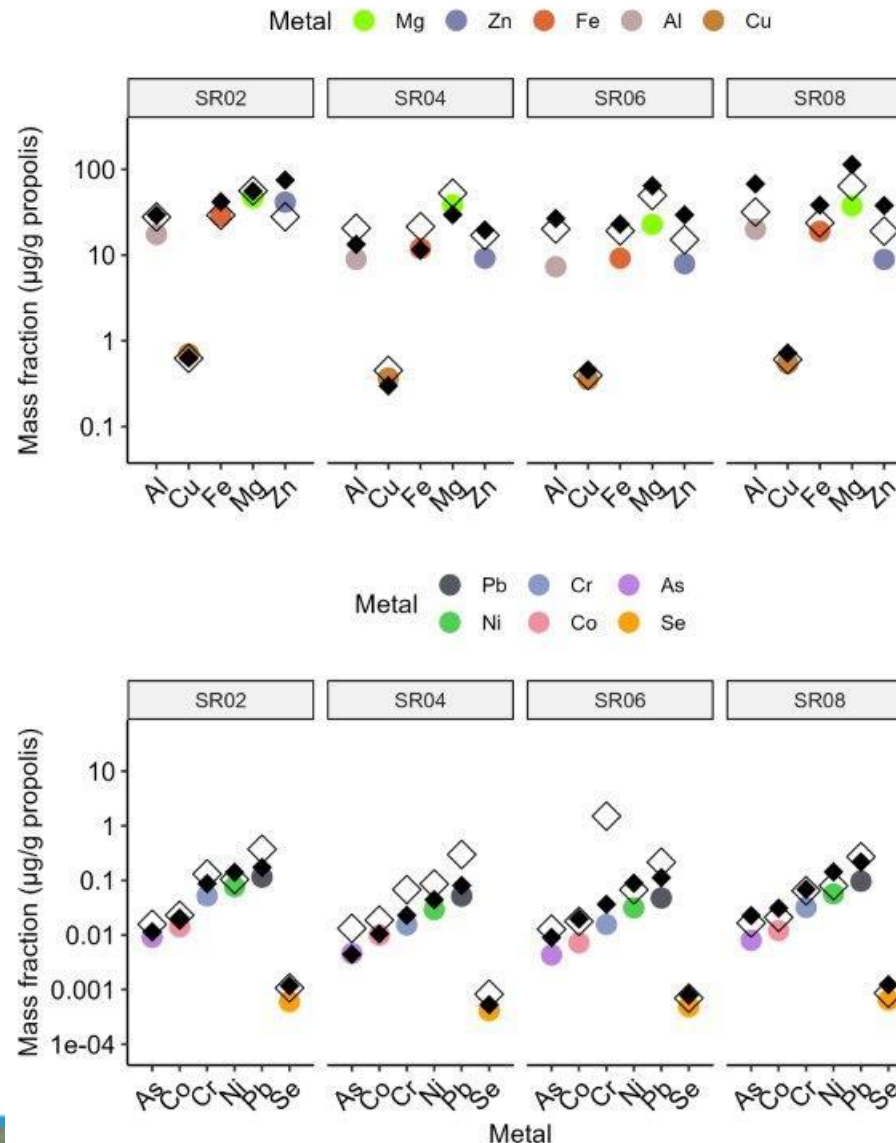


High agricultural

Diamante nero:
media nazionale

Diamante bianco:
media europea





Diamante nero:
media nazionale

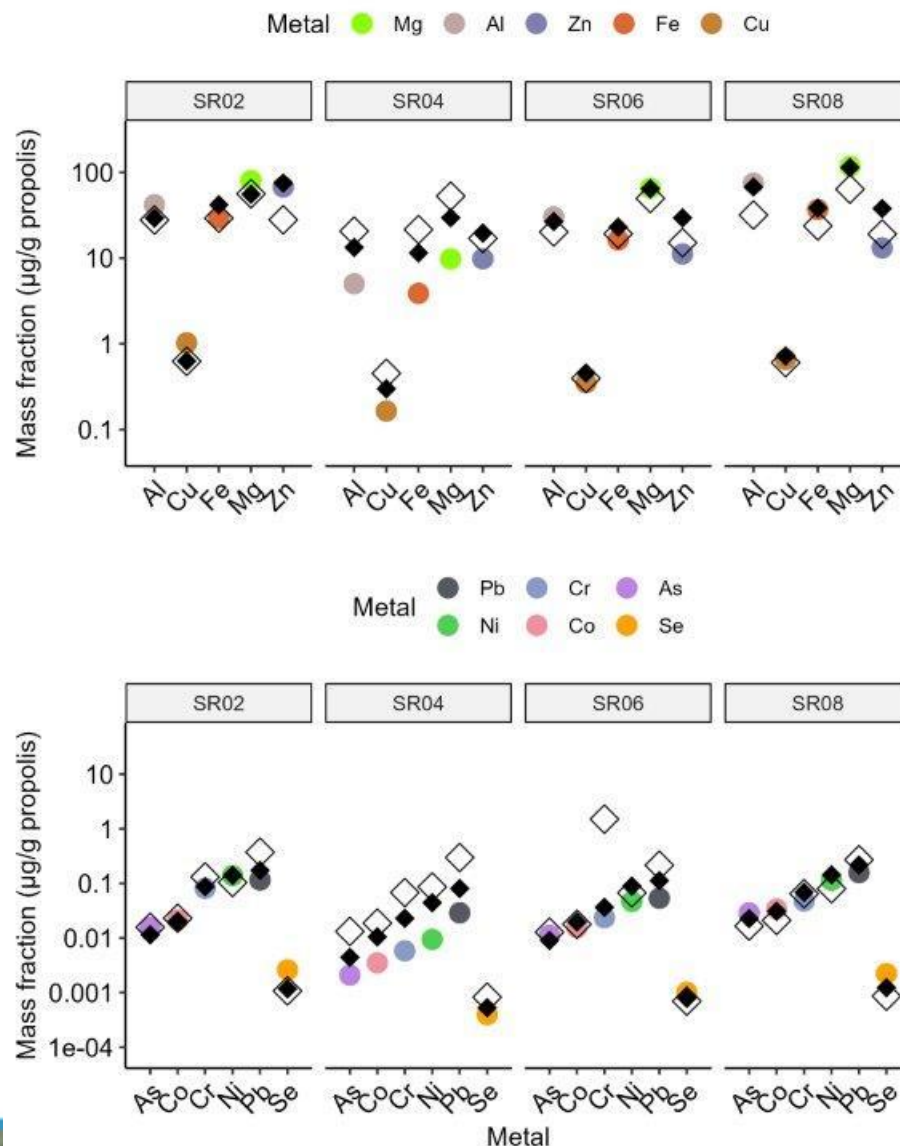
Diamante bianco:
media europea



Diamante nero:
media nazionale

Diamante bianco:
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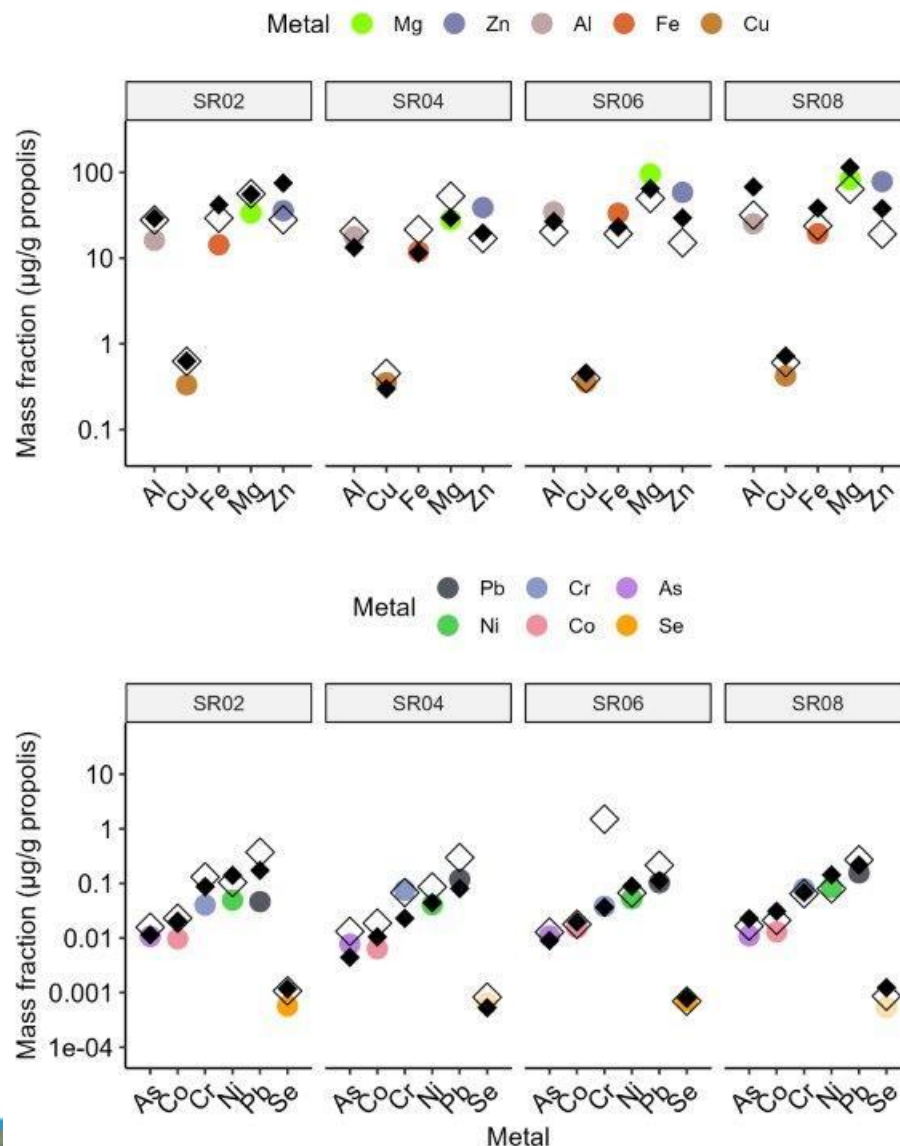
High agricultural

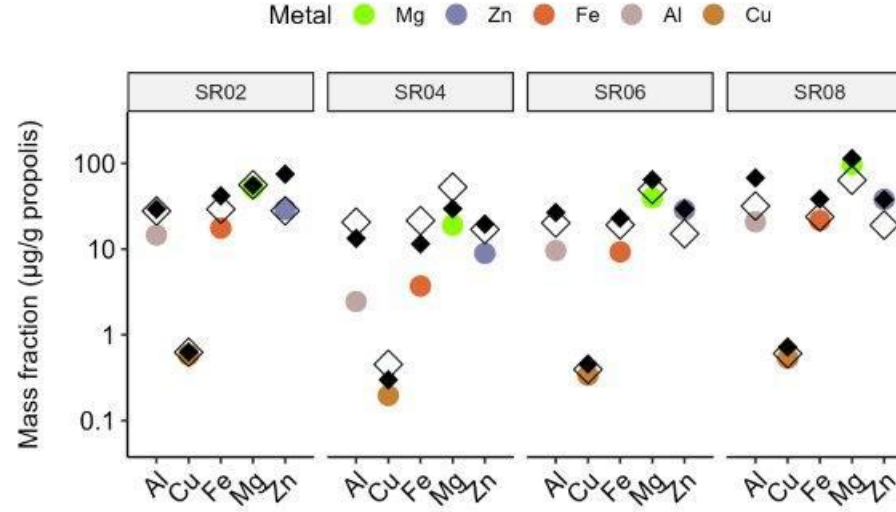


Diamante nero:
media nazionale

Diamante bianco:
media europea

Medium agricultural

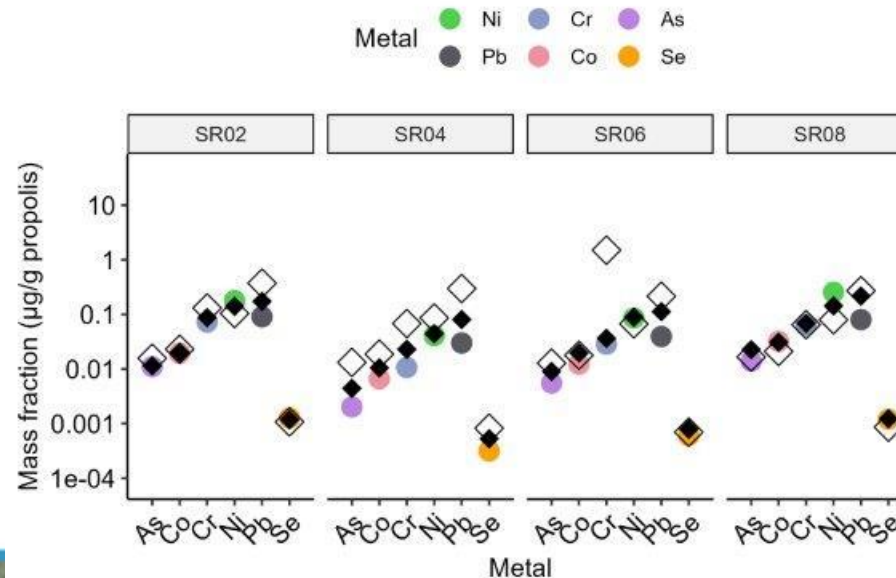




Medium agricultural

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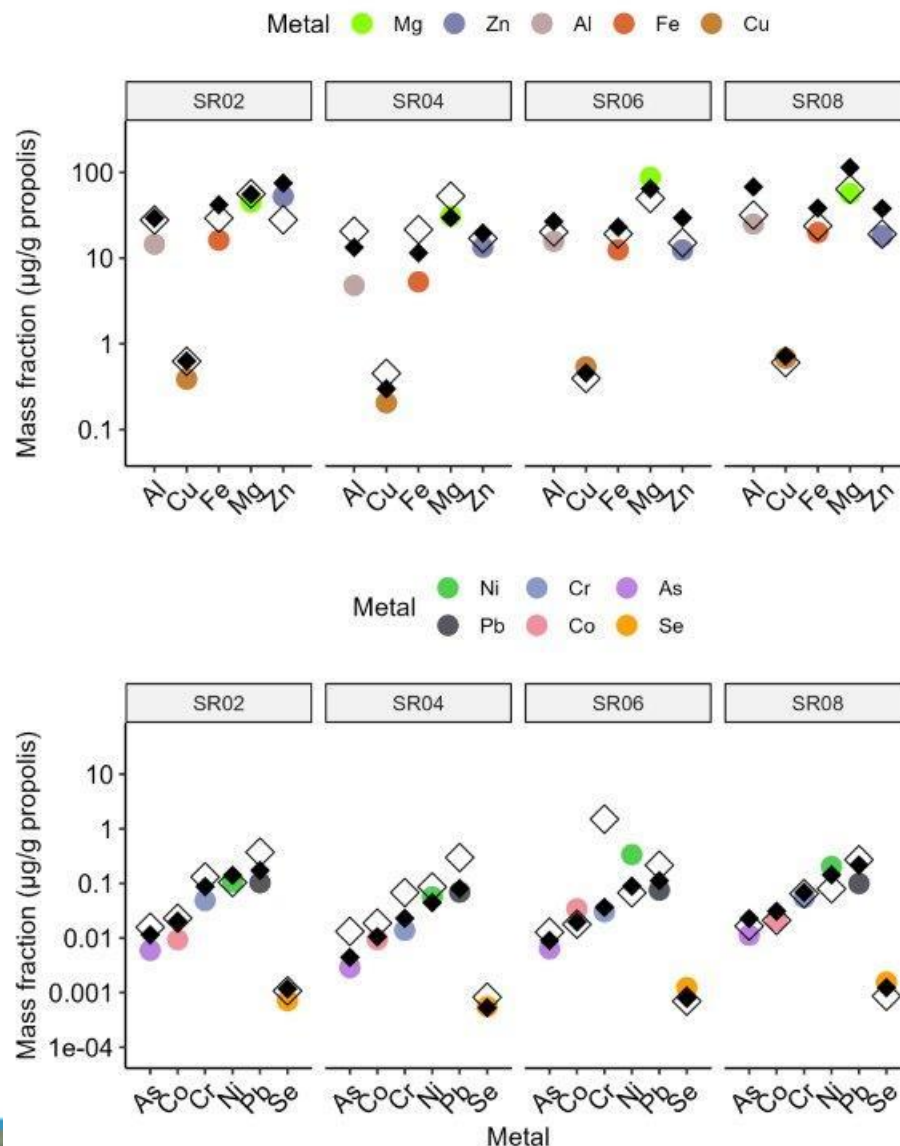
Diamante bianco:
media europea



Diamante nero:
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Diamante bianco:
media europea

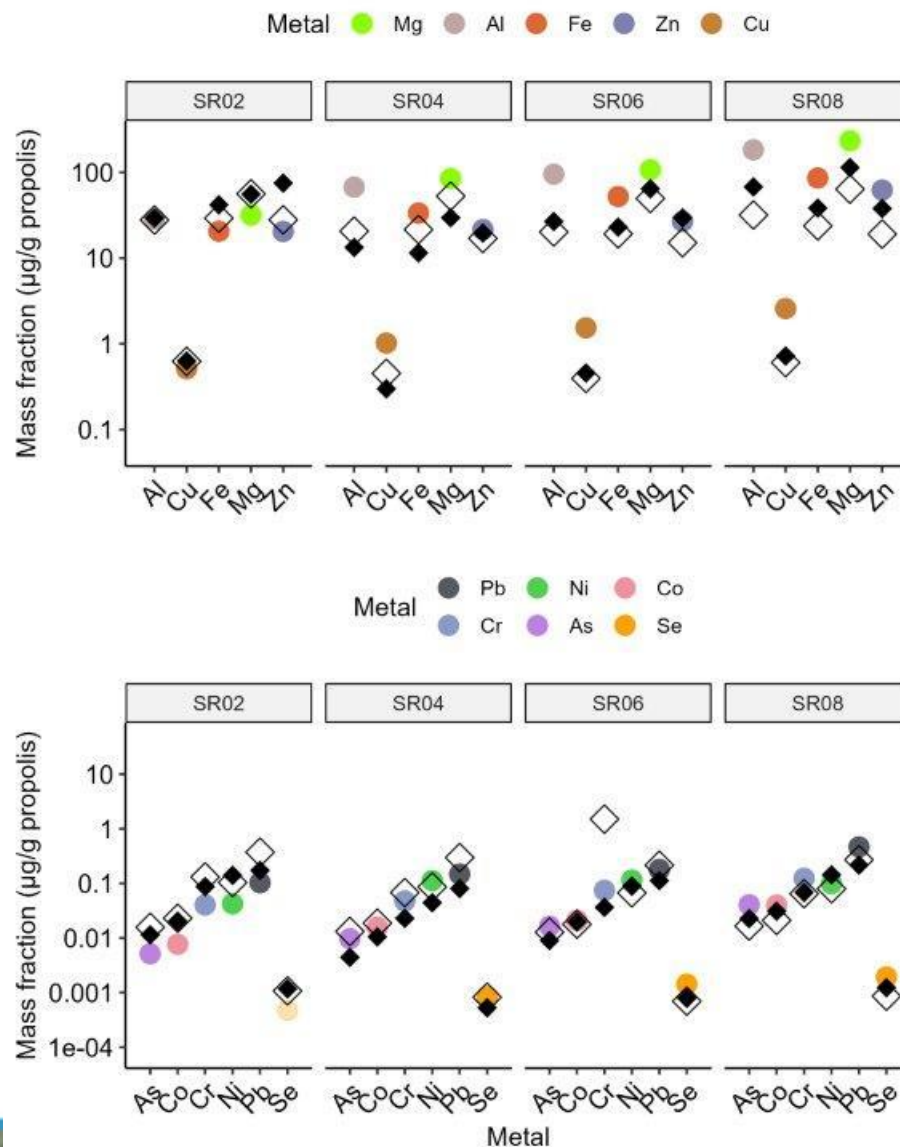
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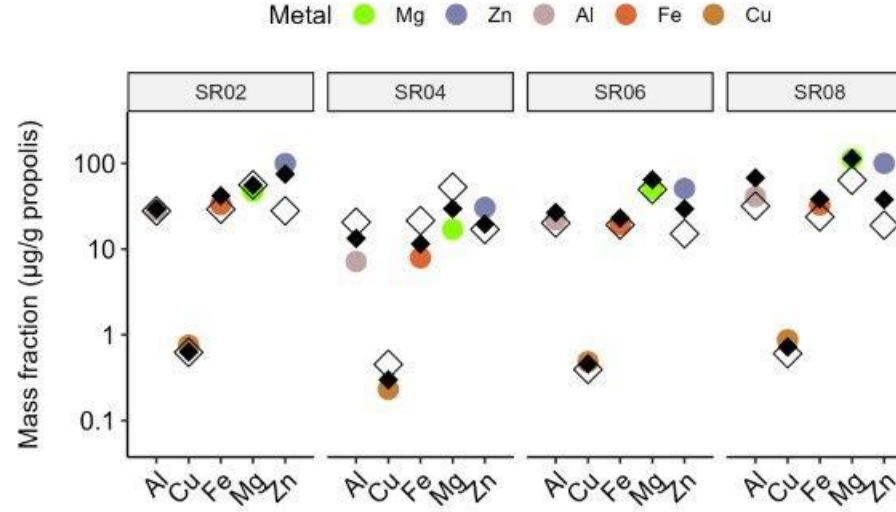


Diamante nero:
media nazionale

Diamante bianco:
media europea

Medium agricultural

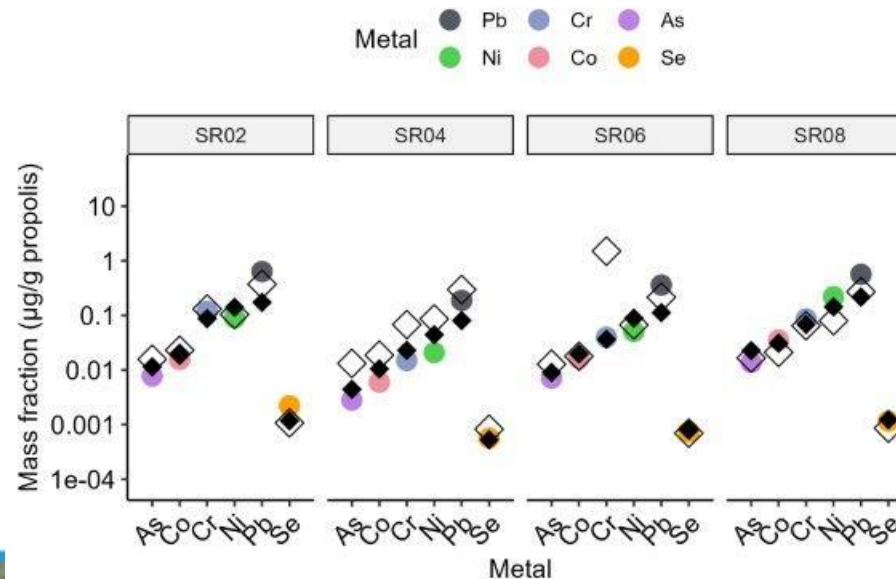


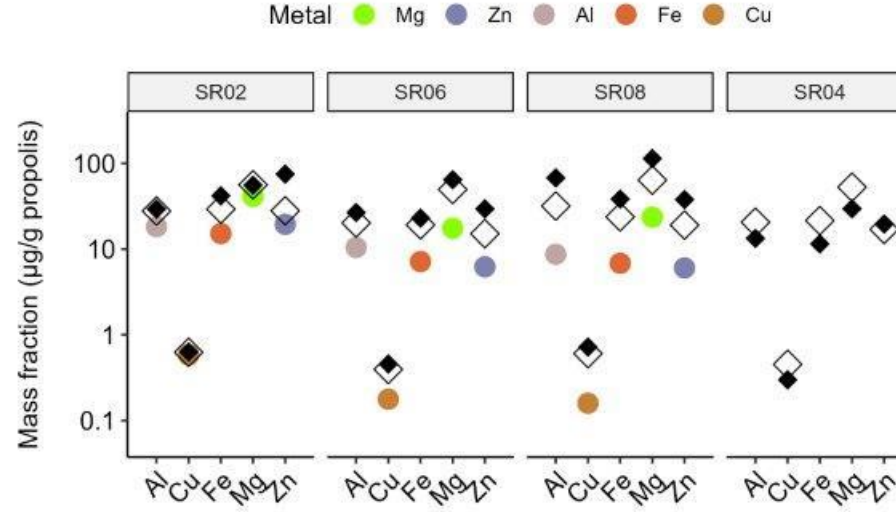


Medium agricultural

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media europea

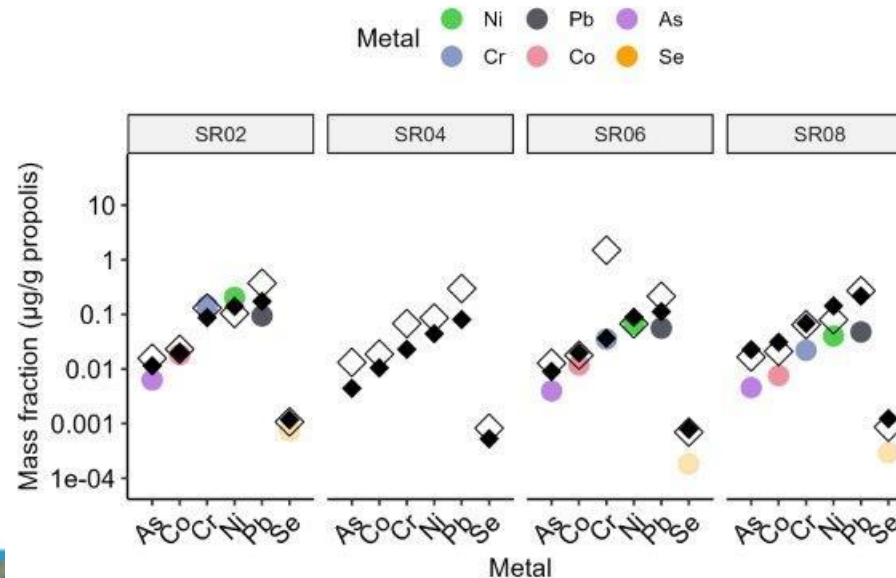


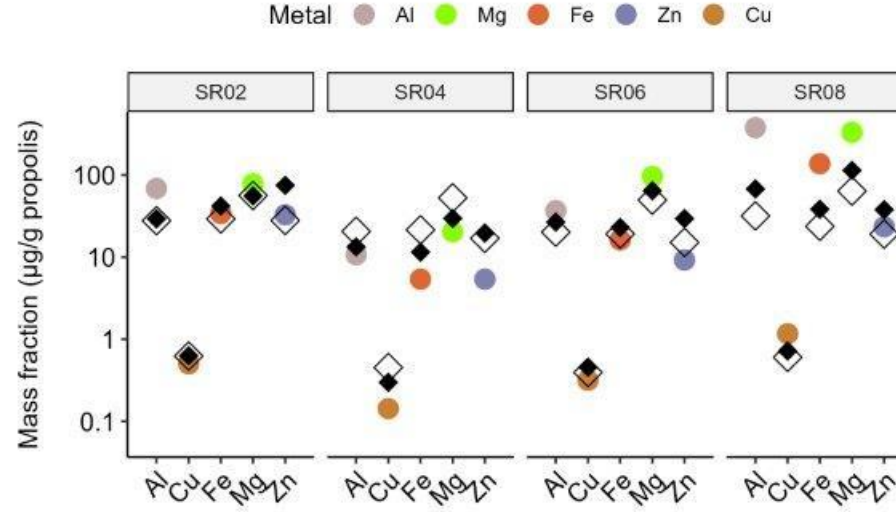


Medium agricultural

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media europea

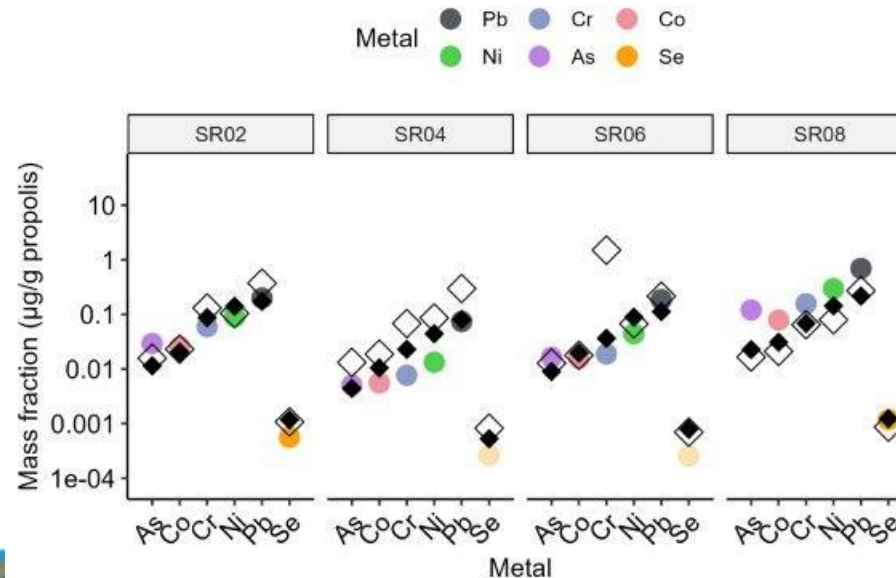




Low agricultural

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media nazionale

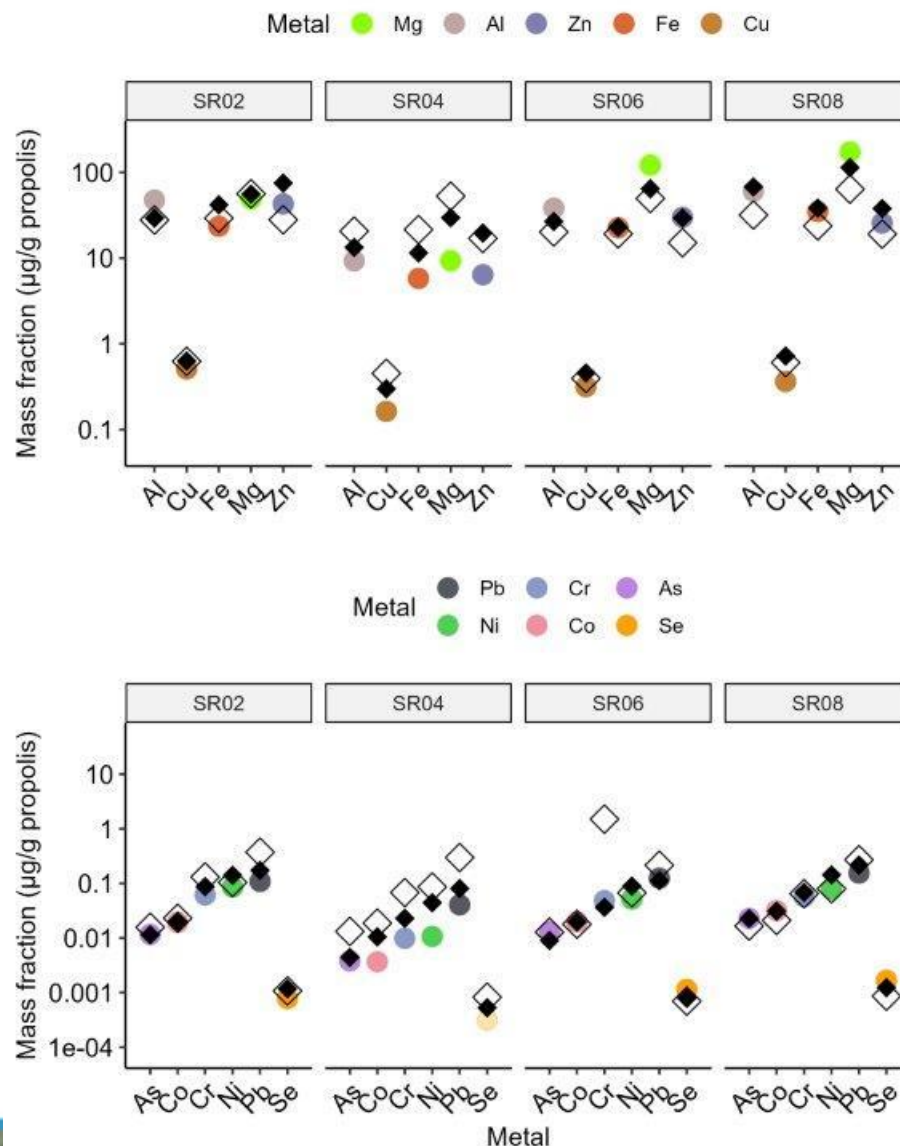
Diamante bianco:
media europea



Diamante nero:
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Diamante bianco:
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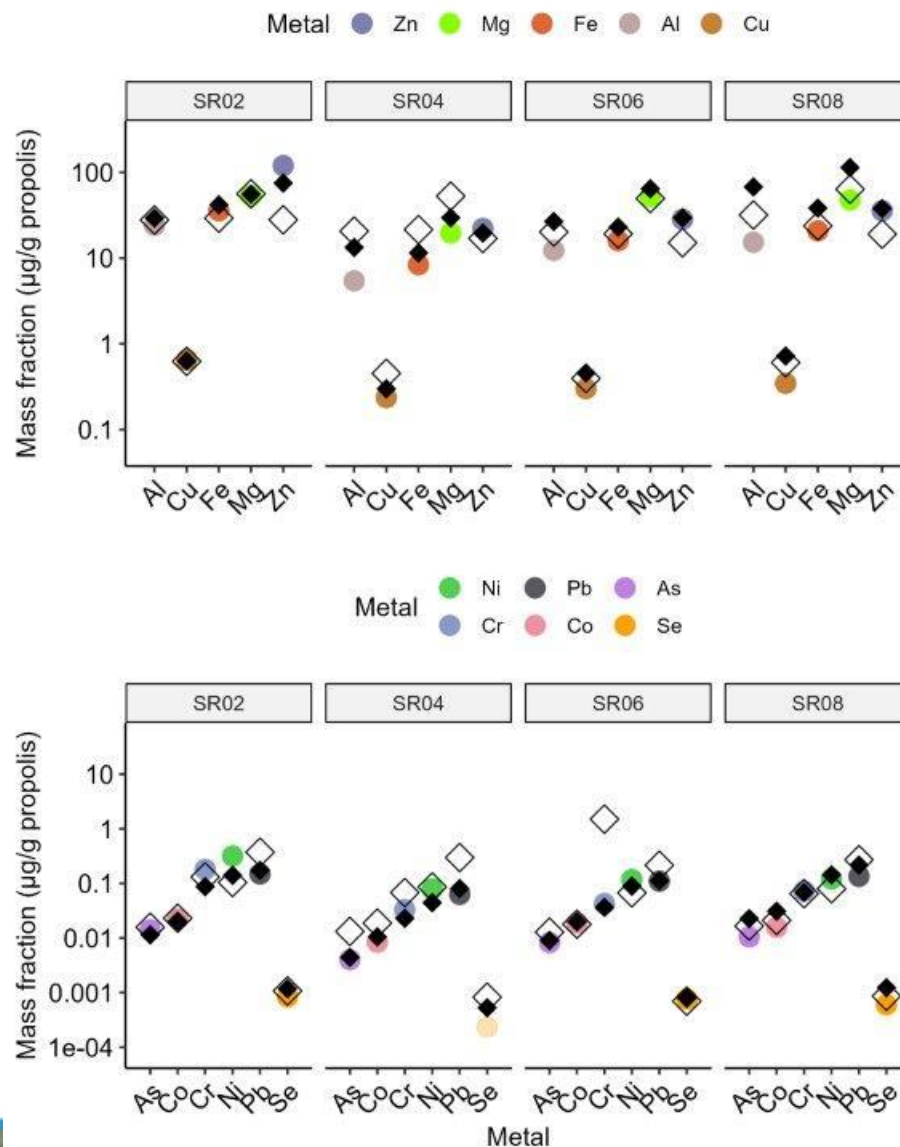
Low agricultural

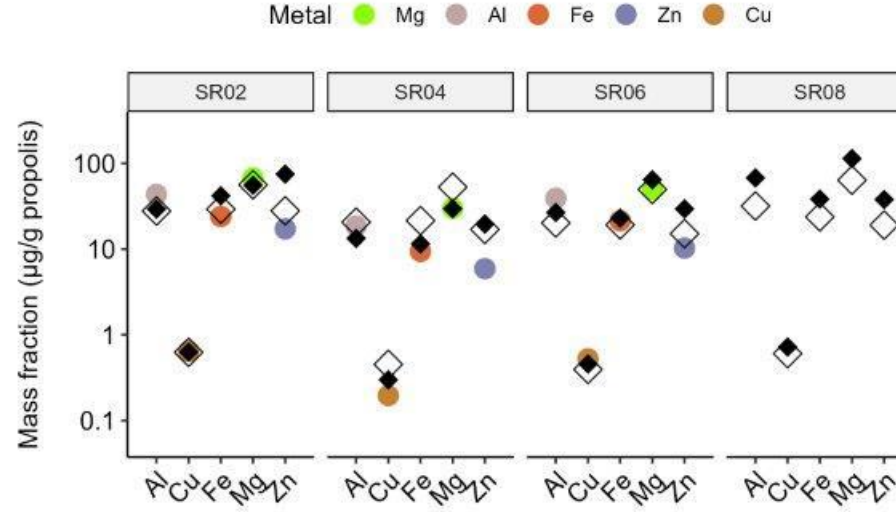


Diamante nero:
media nazionale

Diamante bianco:
media europea

High artificial

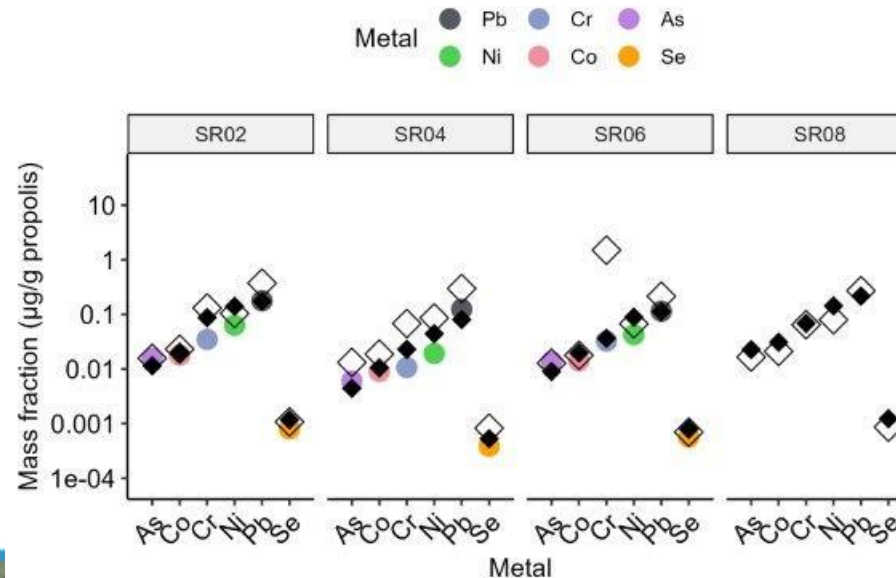




High artificial

Diamante nero:
media nazionale

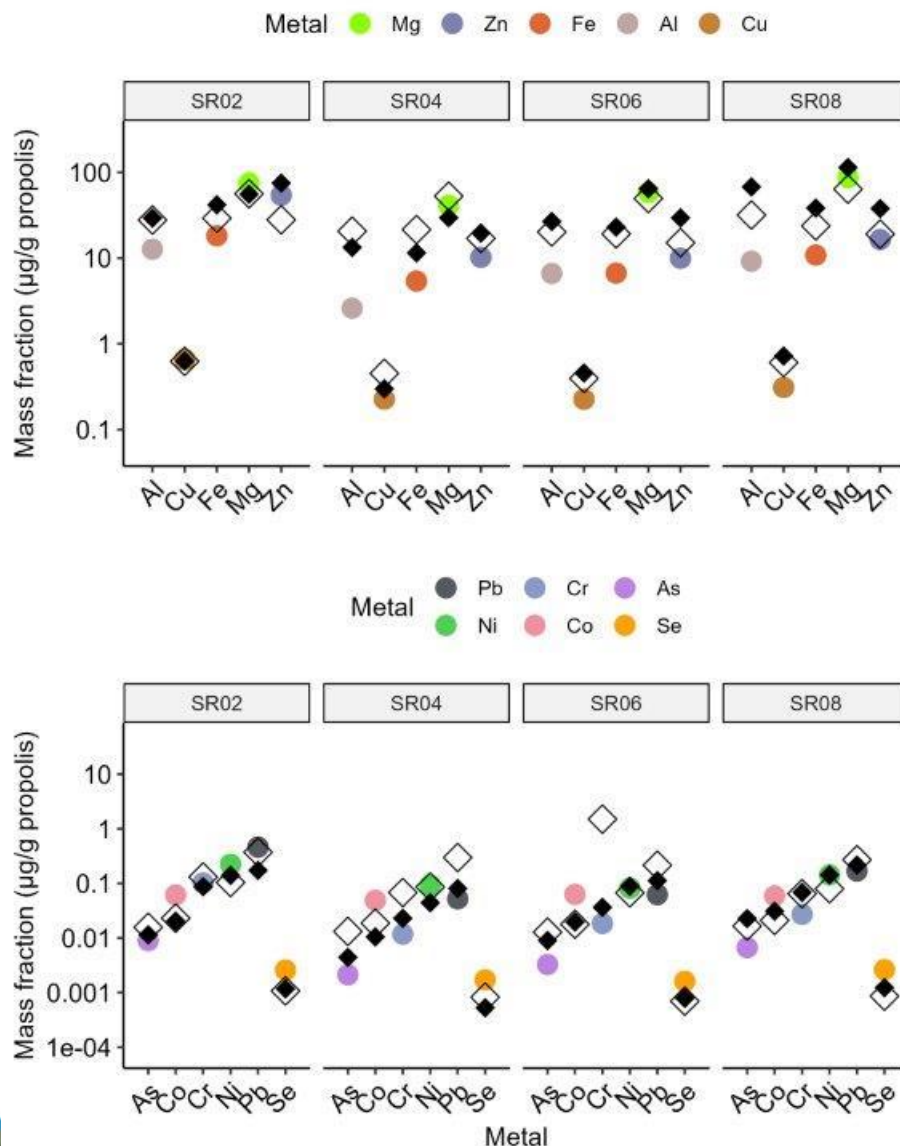
Diamante bianco:
media europea

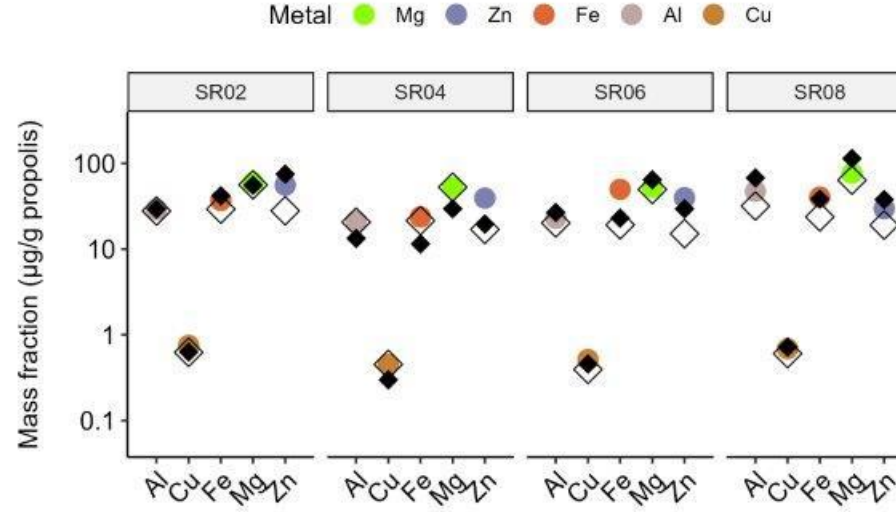


Diamante nero:
media nazionale

Diamante bianco:
media europea

Medium natural

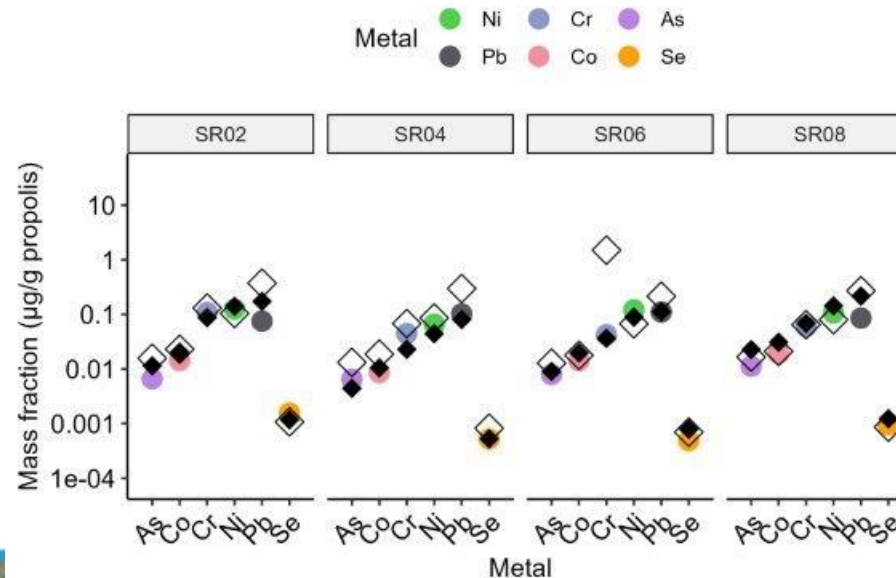




Medium natural

Diamante nero:
media nazionale

Diamante bianco:
media europea



Risultati metalli pesanti

Molti dei metalli sono specifici dell'area in cui si trova l'apiario

Non ha senso standardizzare in base alle zone

Modellizzazione dei dati europei permetterà di individuare aree maggiormente esposte



Microplastiche

Frammenti, fibre, films

Frammenti: particelle con forma e bordi irregolari,

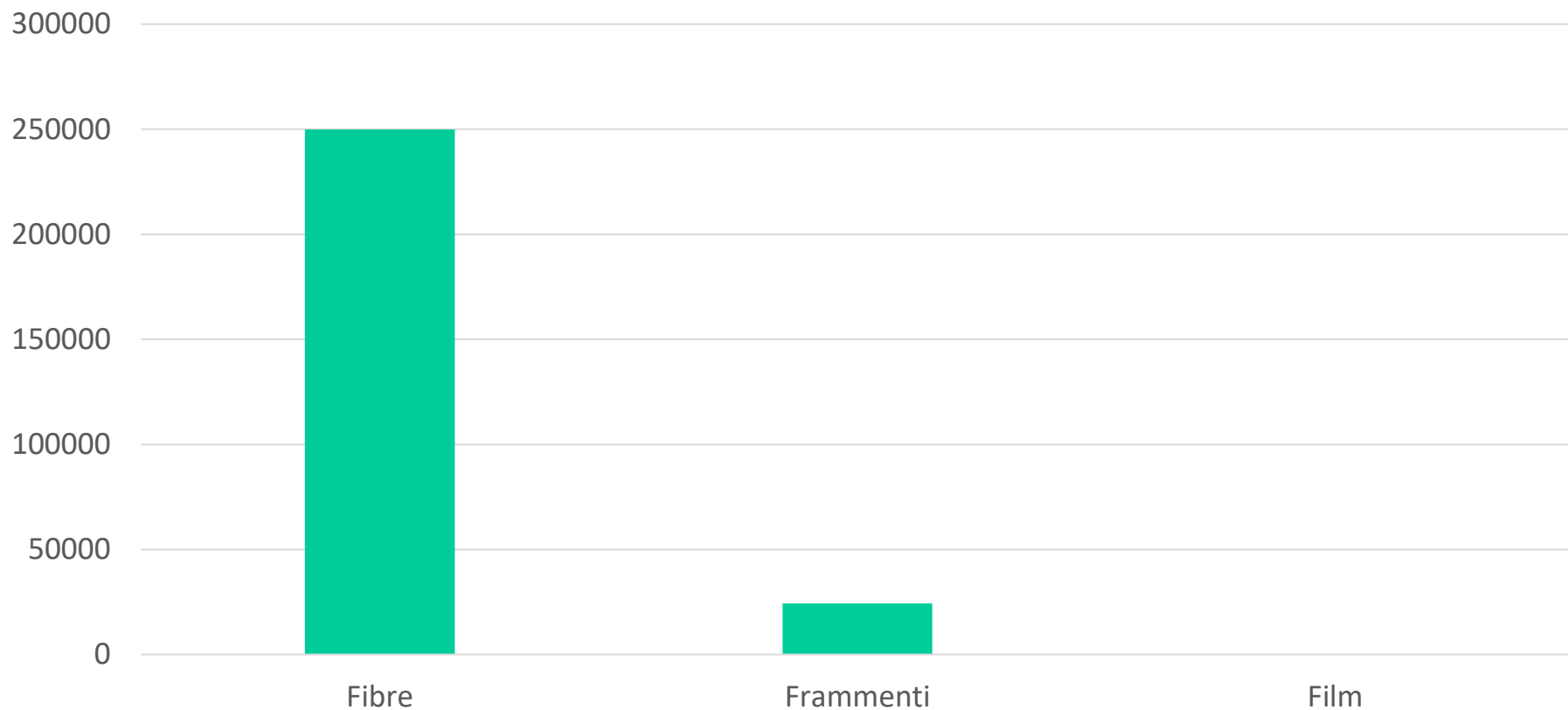
Film sono irregolari, ma più sottili dei frammenti e con un aspetto flessibile.

Fibre e filamenti sono maggiore lunghezza è rispetto a larghezza o diametro
fibre o film rapporto d'aspetto (lunghezza/larghezza) > 4

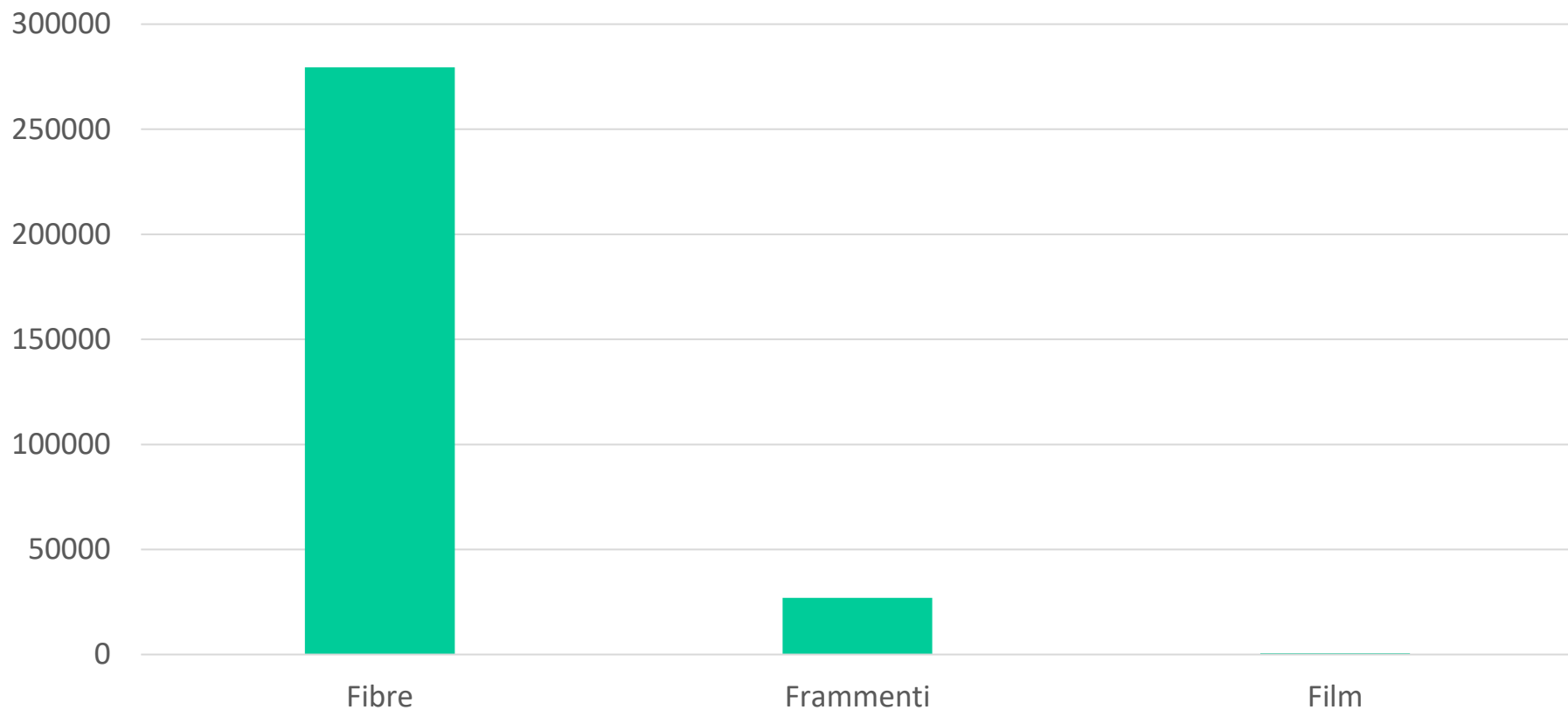
Divise in base al colore e al materiale



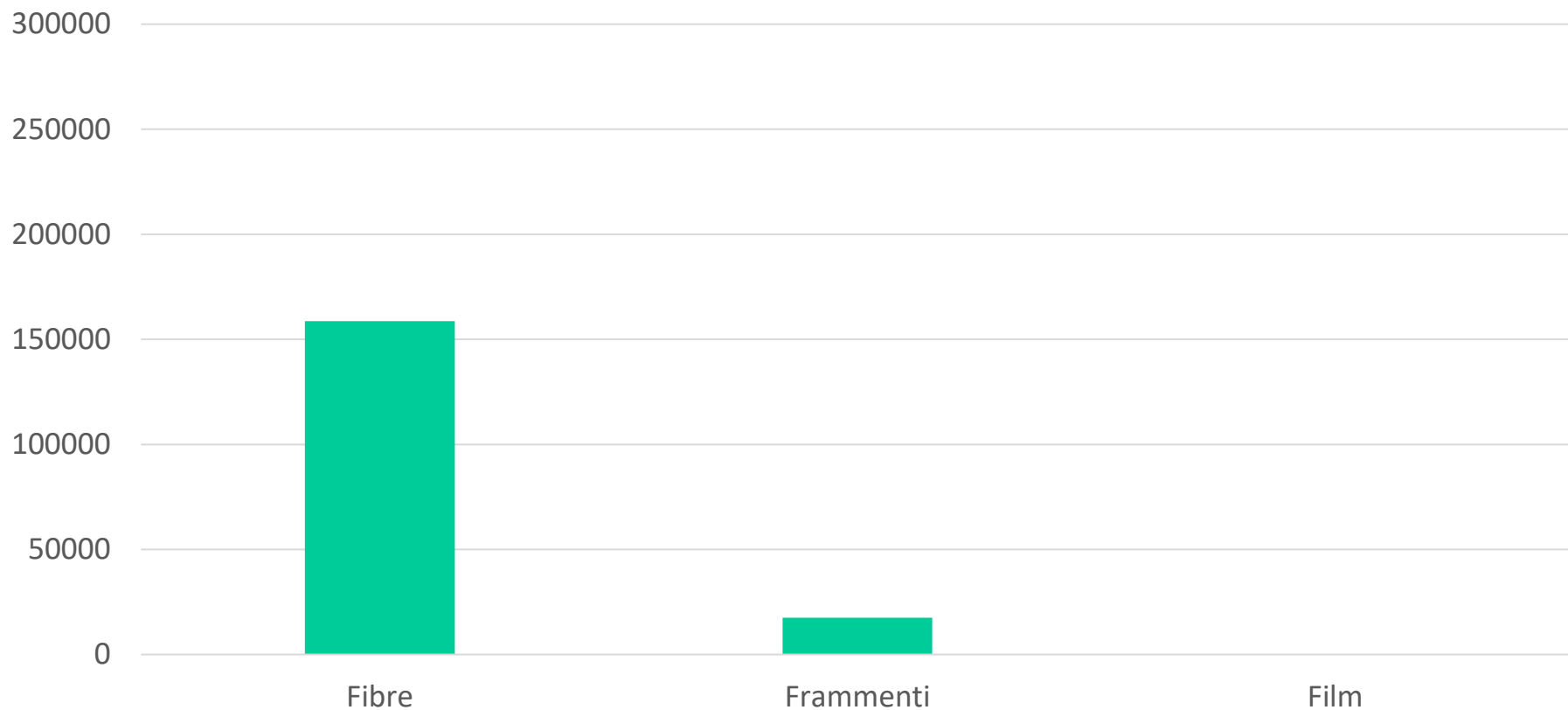
HIGH AGRICULTURAL



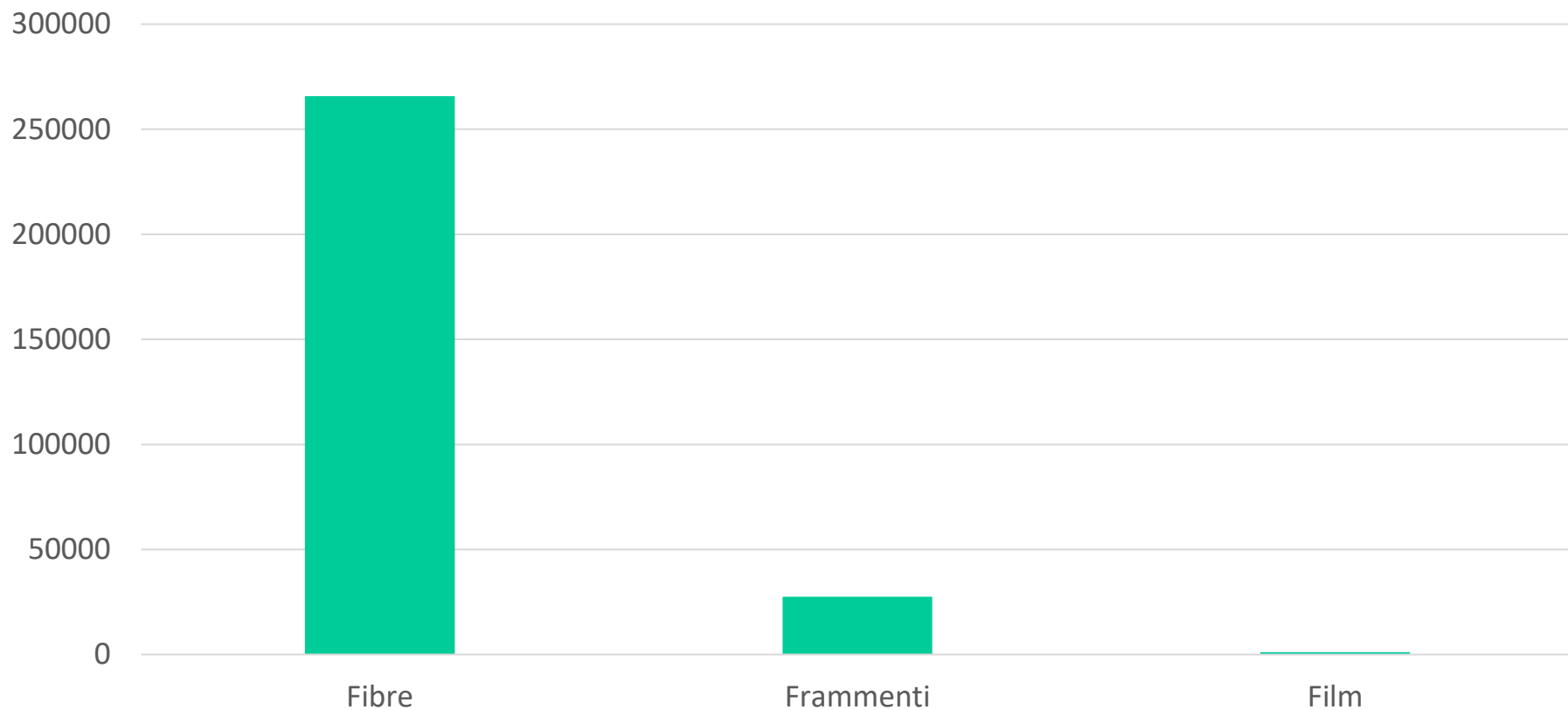
MEDIUM AGRICULTURAL



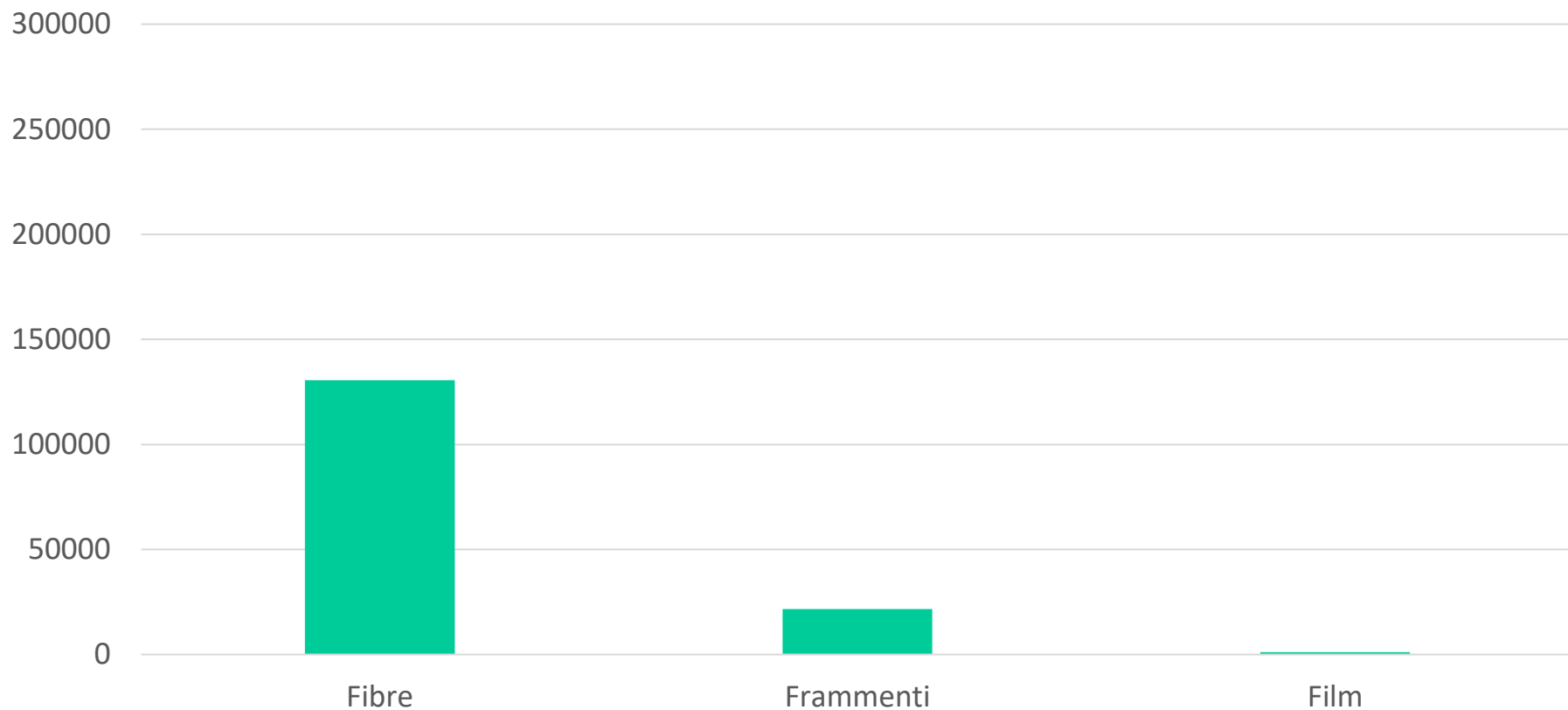
LOW AGRICULTURAL



HIGH ARTIFICIAL



MEDIUM NATURAL



Risultati microplastiche

Interessanti trend in base alla zona

Nuovo argomento di interesse per il mondo della ricerca

Modellizzazione dati permetterà di conoscere l'effettivo impatto del problema (hotspot?)



Argomenti per discussione

Api come **strumento** di biomonitoraggio (pro e contro)

Proposte per **obiettivi di un nuovo progetto** INSIGNIA-EU

Valutazione impatto animale-uomo-ambiente (One-Health)

Altri inquinanti da ricercare



GRAZIE DEL VOSTRO SUPPORTO !



Dr. Marco Pietropaoli



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