

*Famille Michaud*

APICULTEURS DEPUIS 1920

Intertek

# Pollen spectra of selected monoflora & polyfloral honeys of China

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# overview

## I. Monofloral Honeys

- Robinia
- Fagopyrum
- Citrus
- Foeniculum
- Tilia
- Astragalus
- Brassica
- Helianthus
- Vitex
- Ziziphus

## II. Polyflora Honey

# Robinia (Acacia honey)



## Physico/chemical data:

Color: 5 mm Pfund

Moisture: 18.2%

Electrical conductivity: average 0.147 mS/cm  
(0.122-0.199 mS/cm)

## Pollen spectrum:

Density: low

Robinia: average 43% (21 - 74 %)

Robinia >45% -> 50%

15%<Robinia>45% -> 8%

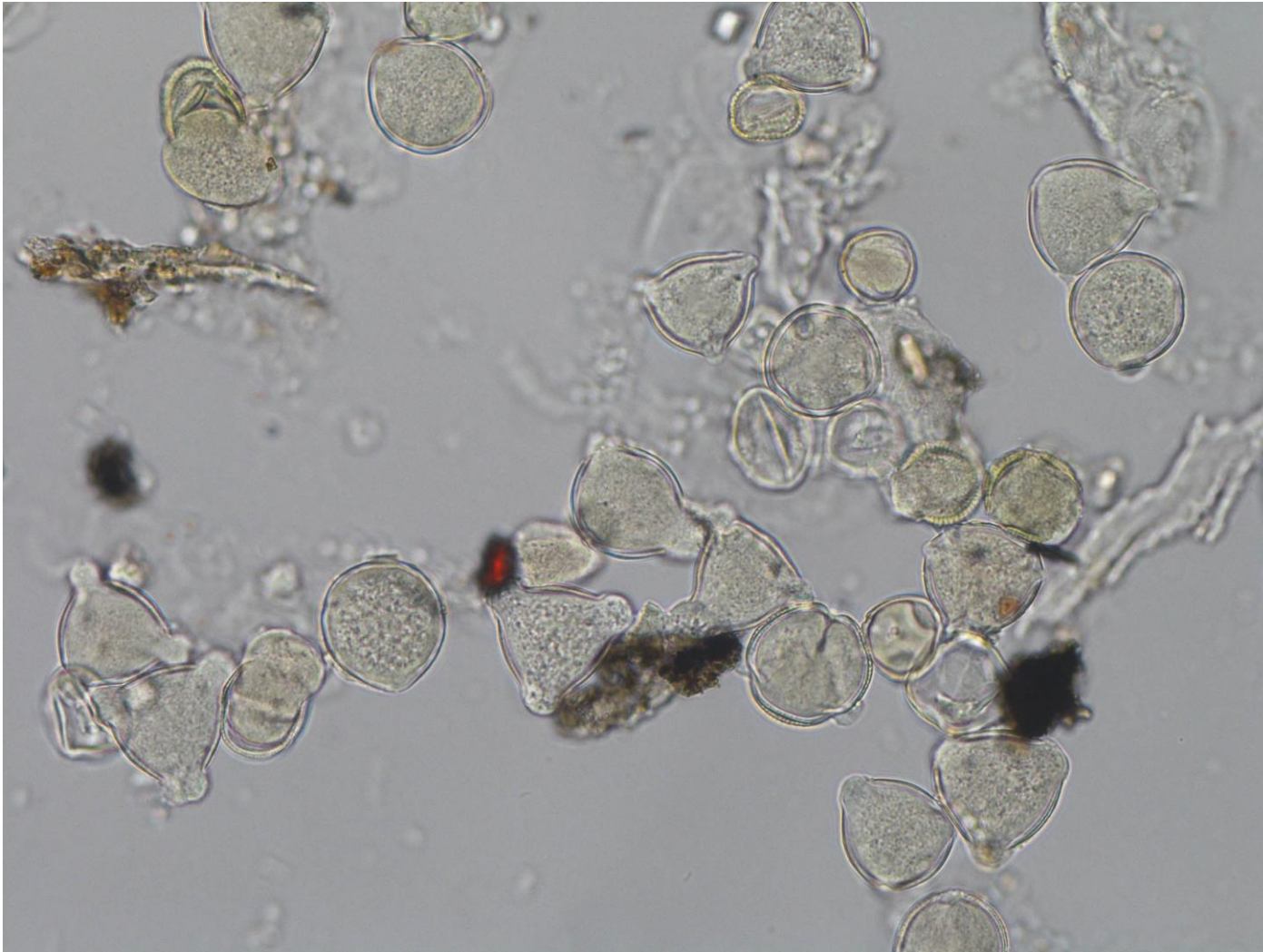
15%<Robinia- Eurya >45% -> 13%

15%<Robinia-Brassicaceae >45% -> 13%

15%<Robinia-"Spireae" >45% -> 7%

Other pollen types: Astragalus, Lonicera,  
Celastraceae, Rosaceae, Pinus, Vicia,  
Asteraceae Type, Catalpa, Actinidia,  
Helianthus, Rhamnaceae, Quercus, Rubus,  
Chenopodiaceae, Poaceae, Caesalpiaceae,  
Papaveraceae

# Robinia (Acacia Honey)



Number of samples: 117  
Years: 2010/11 and 2015/16

Physico-chemical parameter:

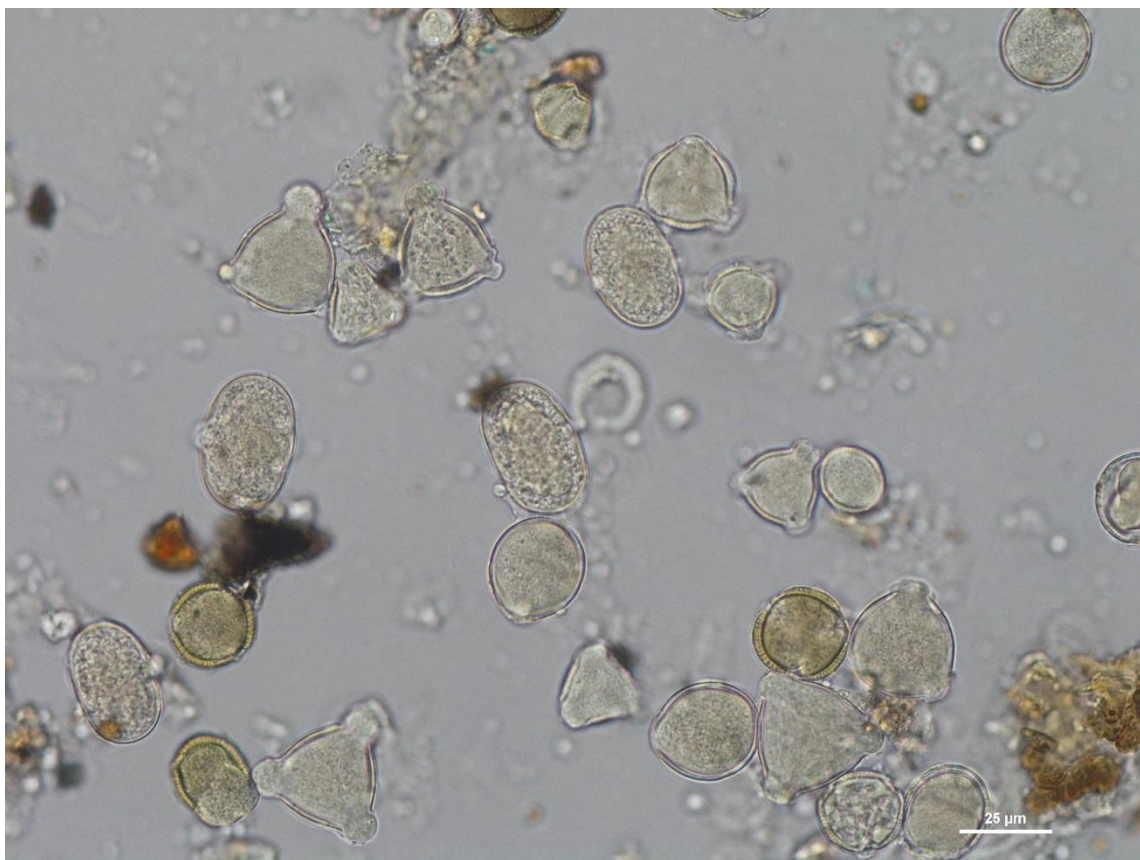
Electrical conductivity: mean 0.135 mS/cm  
(0.100 – 0.19 mS/cm)

# relative abundances of pollen in *Robinia* Honeys

> 45 %	> 15 x < 45 %	> 3 x < 15 %	
Leguminosae Astragalus Leguminosae Robinia	Celastraceae Crassulaceae Cruciferae Leguminosae Astragalus Leguminosae Robinia Paulowniaceae Paulownia-T Rosaceae	Caprifoliaceae Celastraceae Compositae Crassulaceae Crassulaceae Cruciferae Fagaceae Leguminosae Leguminosae Leguminosae Paulowniaceae Rhamnaceae Rosaceae Tamaricaceae	Lonicera    Sedum-T  Castanea Astragalus Robinia Vicia-T Paulownia-T  Pyrus/Prunus-T Tamarix-T

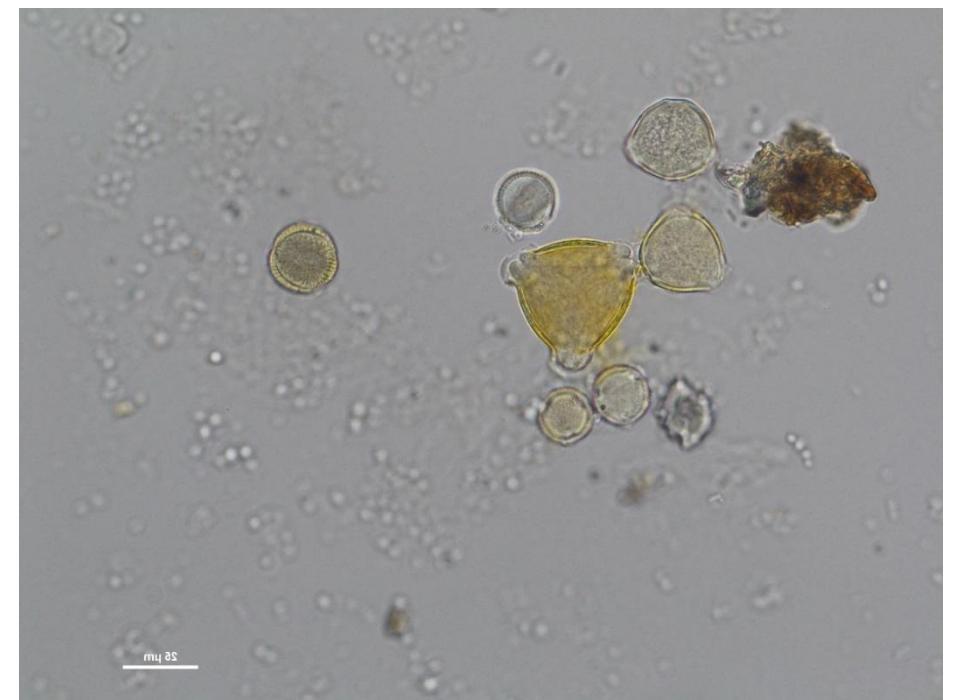


# Pollen Spectrum of Robinia Honeys



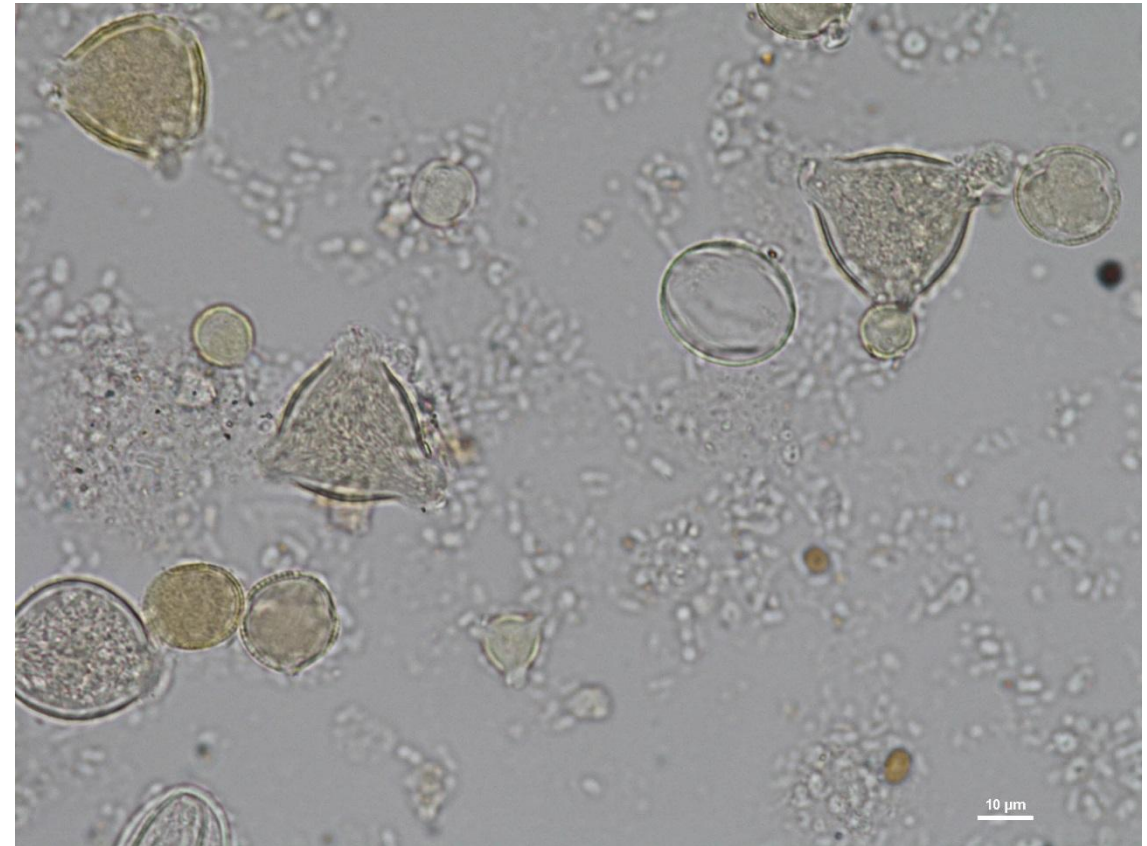
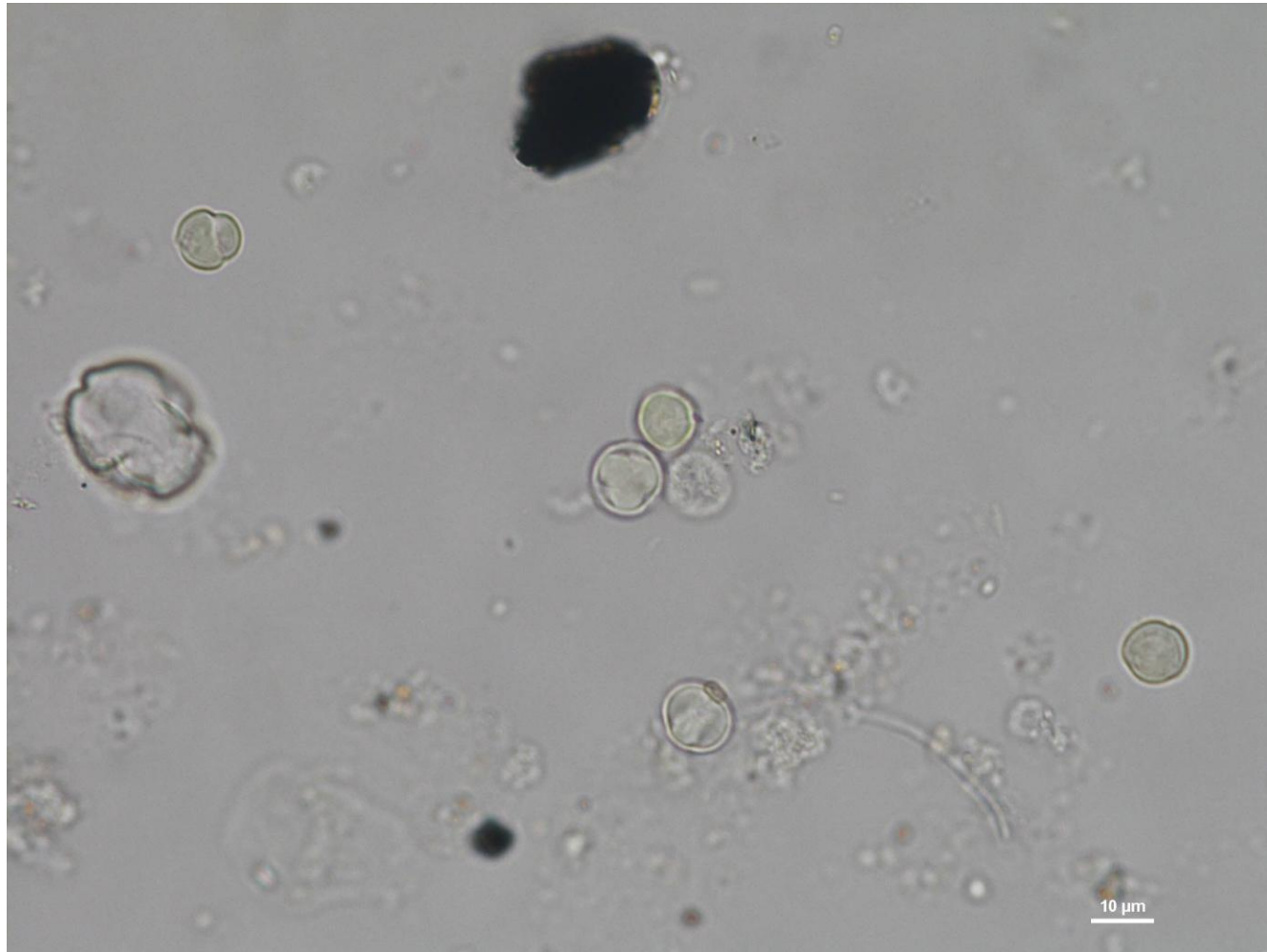
Acer, Actinidia-T, Anacardiaceae, Aquifoliaceae, Araliaceae, Betulaceae, Catalpa, Echium, Myosotis-T, Boraginaceae, Gleditsia-T, Caesalpiniaceae, Lonicera, Caprifoliaceae, Caryophyllaceae, Celastraceae, Chenopodiaceae, Artemisia, Carthamus-T, Centaurea cyanus-T, Helianthus-T, Serratula-T, Taraxacum-T, Compositae, Convolvulaceae, Cornaceae, Sedum-T, Crassulaceae, Cruciferae, Citrullus, Cucurbitaceae, Cyperaceae, Elaeagnaceae, Ephedra-T, Euphorbiaceae, Castanea, Quercus, Zea, Gramineae, Juglandaceae, Labiatae, Lauraceae, Amorpha, Astragalus, Lotus, Onobrychis, Trifolium-T, Vicia-T, Liliaceae, Malvaceae, Mimosa pudica-T, Myrtaceae, Davidia, Oleaceae, Palmae, Papaveraceae, Paulownia-T, Sesamum, Flueggea-T, Pinus, Pinaceae, Fagopyrum, Rumex, Rhamnaceae, Pyrus/Prunus-T, Rubus-T, Sanguisorba officinalis-T, Rosaceae, Citrus, Salix, Sapindaceae, Ailanthus, Tamarix-T, Camellia, Eurya-T, Tilia, Coriandrum, Foeniculum, Umbelliferae, Vitex, Verbenaceae

# Robinia (Acacia Honey)



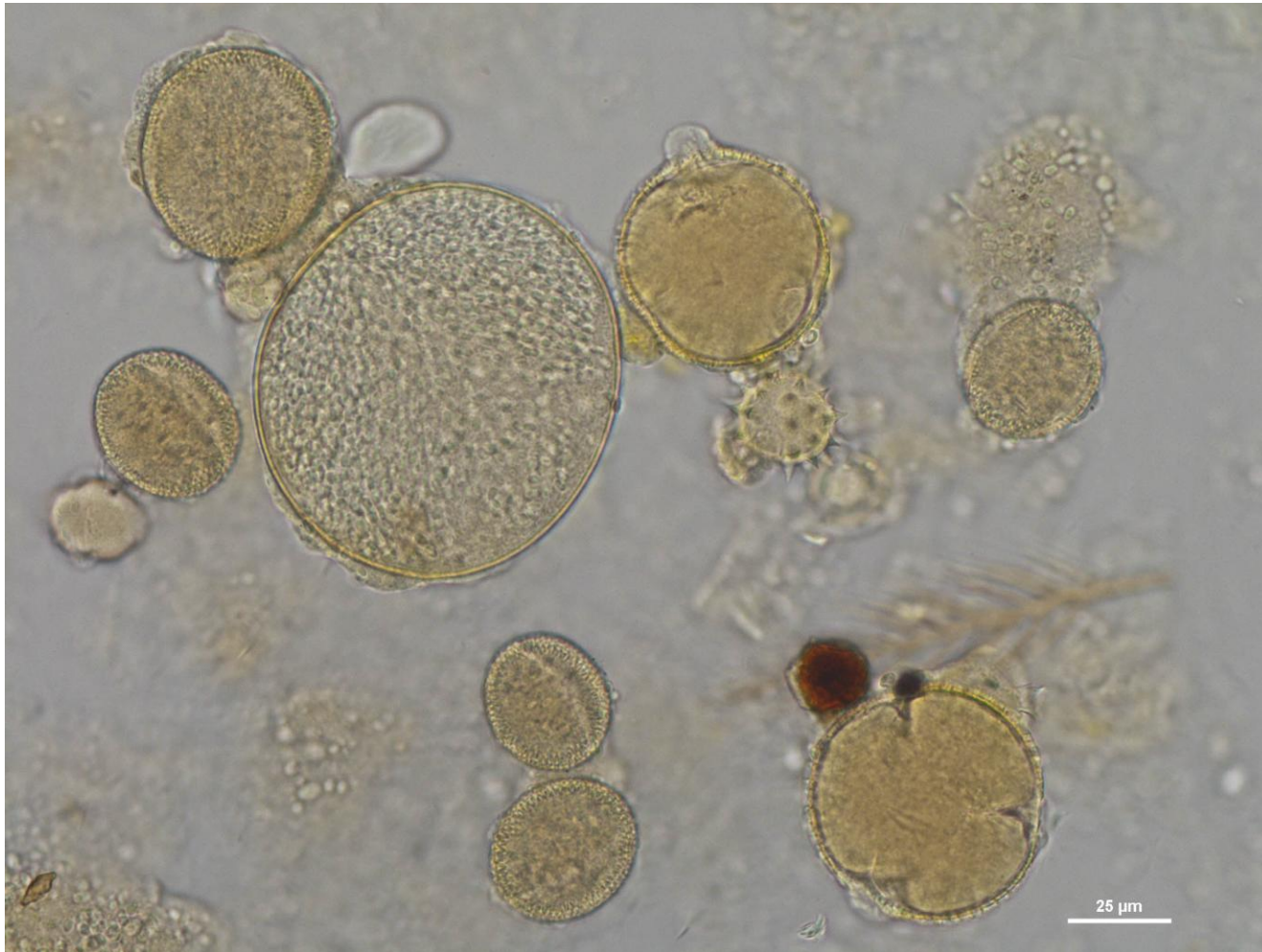


# Robinia (Acacia Honey)





# Fagopyrum (Buckwheat Honey)



Number of samples: 107

Years: 2009 - 2015

Physico-chemical parameter:

Electrical conductivity: mean 0.335 mS/cm  
(0.198 – 0.541 mS/cm)

# relative abundances of pollen in *Fagopyrum* Honeys

> 45 %	> 15 x < 45 %	> 3 x < 15 %
Polygonaceae <i>Fagopyrum</i>	Compositae Compositae <i>Helianthus-T</i> Cruciferae Fagaceae <i>Castanea</i> Leguminosae <i>Astragalus</i> Leguminosae <i>Trifolium-T</i> Polygonaceae <i>Fagopyrum</i> Verbenaceae <i>Vitex</i>	Compositae Compositae <i>Centaurea cyanus-T</i> Compositae <i>Helianthus-T</i> Cruciferae Cucurbitaceae Fagaceae <i>Castanea</i> Labiatae Labiatae <i>Rosmarinus</i> Leguminosae <i>Astragalus</i> Salicaceae <i>Salix</i> Umbelliferae Verbenaceae <i>Vitex</i>

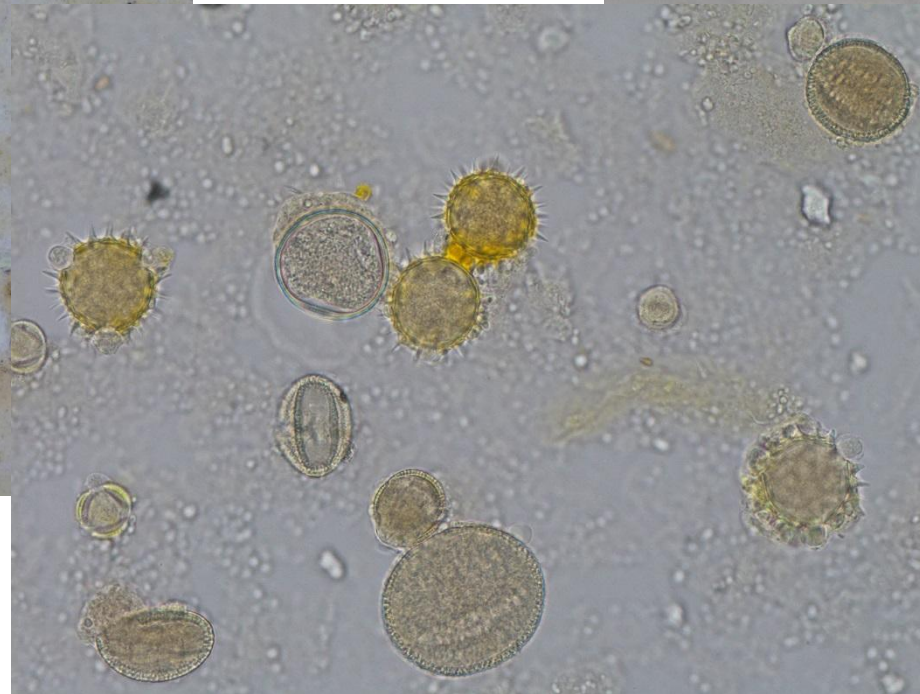
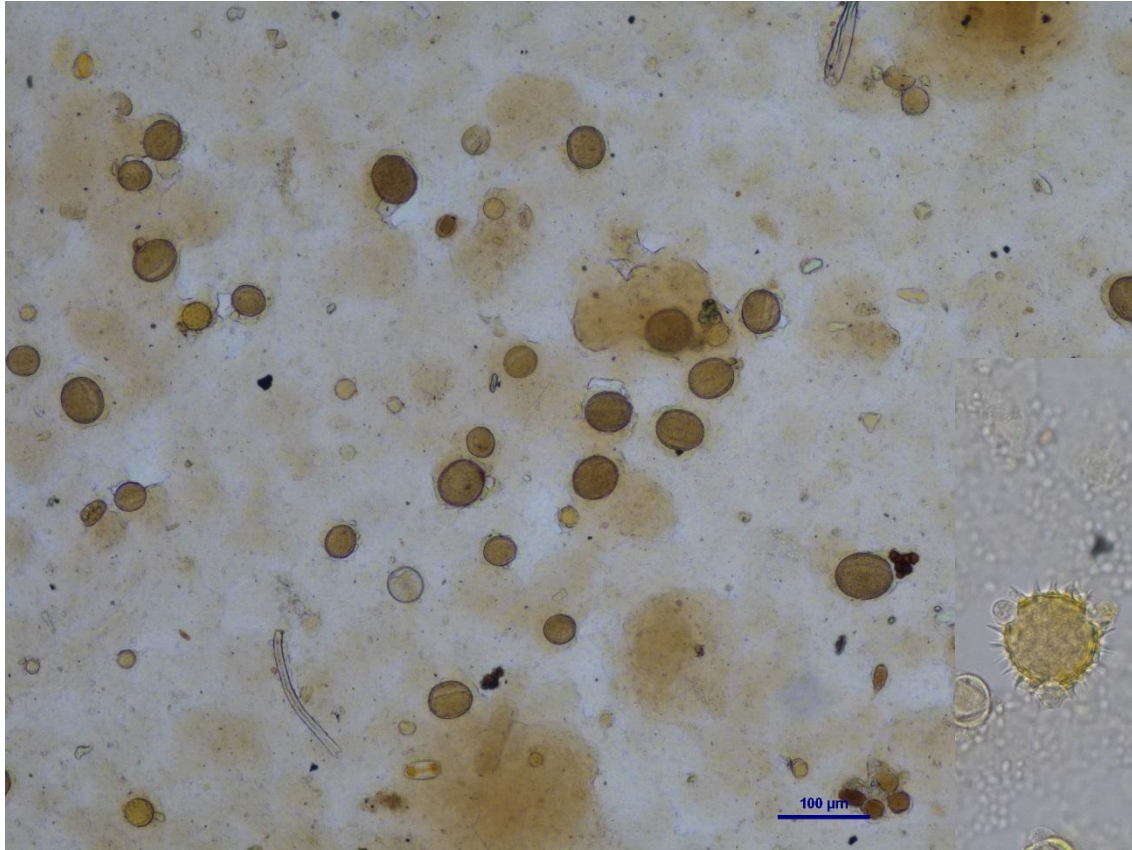
# Pollen Spectrum of Fagopyrum Honeys



Actinidia-T, Anacardiaceae, Impatiens, Echium, Myosotis-T, Gleditsia-T, Lonicera, Caprifoliaceae, Caryophyllaceae, Chenopodiaceae, Artemisia, Centaurea cyanus-T, Helianthus-T, Taraxacum-T, Compositae, Convolvulaceae, Brassica-T, Cruciferae, Citrullus, Cucurbitaceae, Ephedra, Erica-T, Ericaceae, Euphorbiaceae, Castanea, Quercus, Zea, Gramineae, Rosmarinus, Labiatae, Astragalus, Lotus, Onobrychis, Robinia, Trifolium pratense-T, Trifolium-T, Vicia-T, Leguminosae, Liliaceae, Malvaceae, Eucalyptus-T, Myrtaceae, Davidia, Onagraceae, Palmae, Sesamum Rhamnaceae, Pyrus/Prunus-T, Rubus-T, Sanguisorba officinalis-T, Rosaceae, Salix, Sapinadaceae, Tamarix-T, Camellia, Tilia, Coriandrum, Umbelliferae, Vitex, Tribulus



# Fagopyrum (Buckwheat Honey)





# Citrus Honey



Number of samples: 4

Years: 2012 - 2013

Physico-chemical parameter:

Electrical conductivity: mean 0.141 mS/cm

(0.101 – 0.160 mS/cm)

# relative abundances of pollen in *Citrus* Honeys

> 45 %		> 15 x < 45 %		> 3 x < 15 %	
Rutaceae	Citrus	Compositae Cruciferae Rutaceae	Taraxacum-T  Citrus	Cruciferae Leguminosae Compositae	Astragalus Taraxacum-T

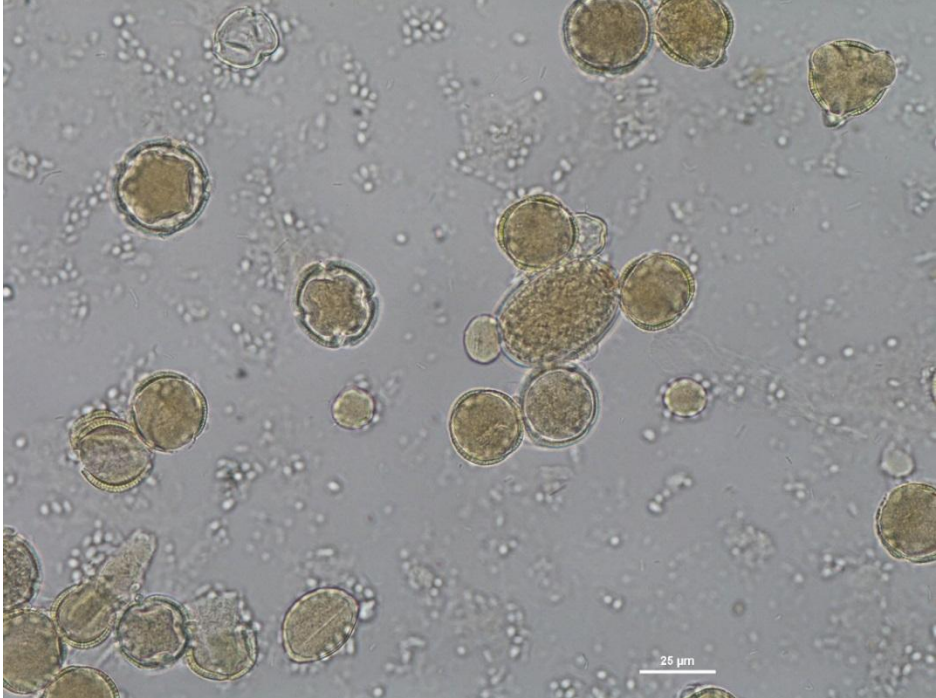
# Pollen Spectrum of Citrus Honeys



Anacardiaceae, Gleditsia-T,  
Celastraceae, Lonicera,  
Caryophyllaceae, Helianthus-T,  
Taraxacum-T, Compositae,  
Convolvulaceae, Cruciferae, Citrullus,  
Castanea, Gramineae, Astragalus,  
Lotus, Trifolium-T, Malvaceae,,  
Palmae, Fagopyrum, Rosaceae, Salix,  
Umbelliferae

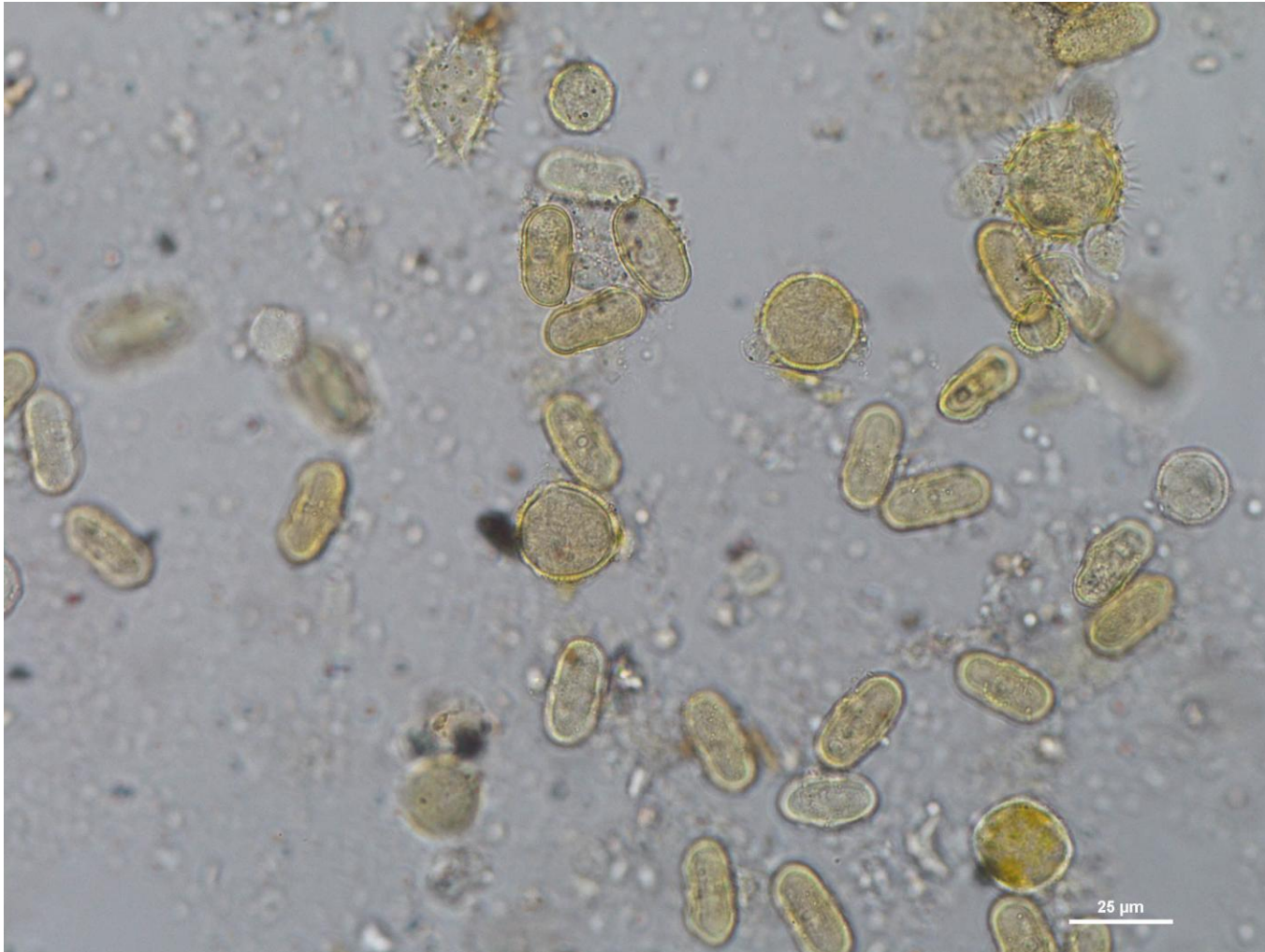


# Citrus Honey





# Foeniculum (Fennel Honey)



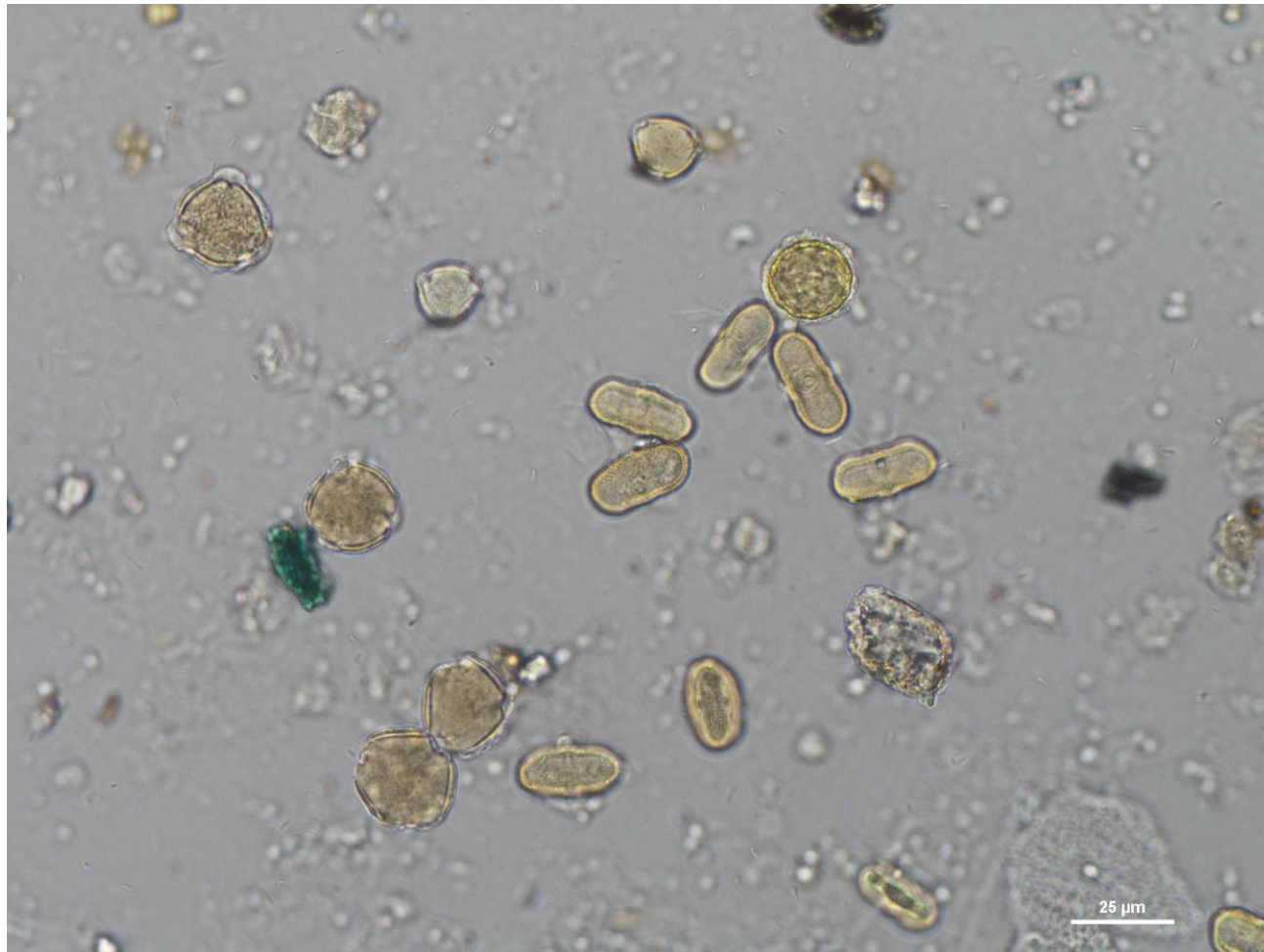
Number of samples: 26  
Years: 2010/11 and 2013-2016

Physico-chemical parameter:  
Electrical conductivity: mean 0.336 mS/cm  
(0.208 – 0.554 mS/cm)

# relative abundances of pollen in *Foeniculum* Honeys

> 45 %		> 15 x < 45 %		> 3 x < 15 %	
Umbelliferae	Foeniculum	Anacardiaceae		Anacardiaceae	
		Cruciferae		Compositae	Helianthus-T
		Verbenaceae	Vitex	Compositae	
				Cruciferae	
				Polygonaceae	Fagopyrum
				Tamaricaceae	Tamarix-T
				Umbelliferae	Coriandrum

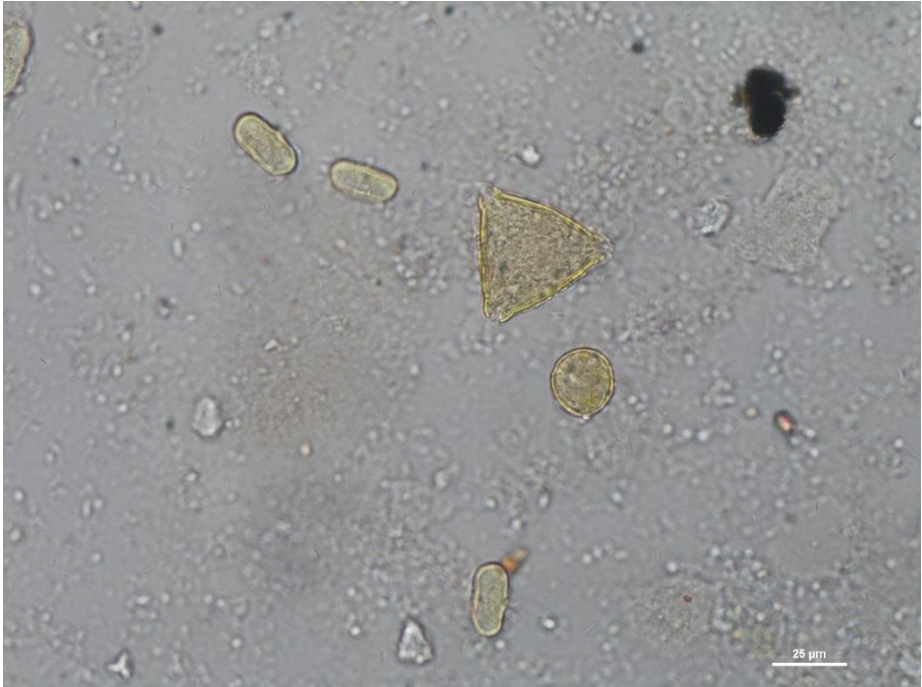
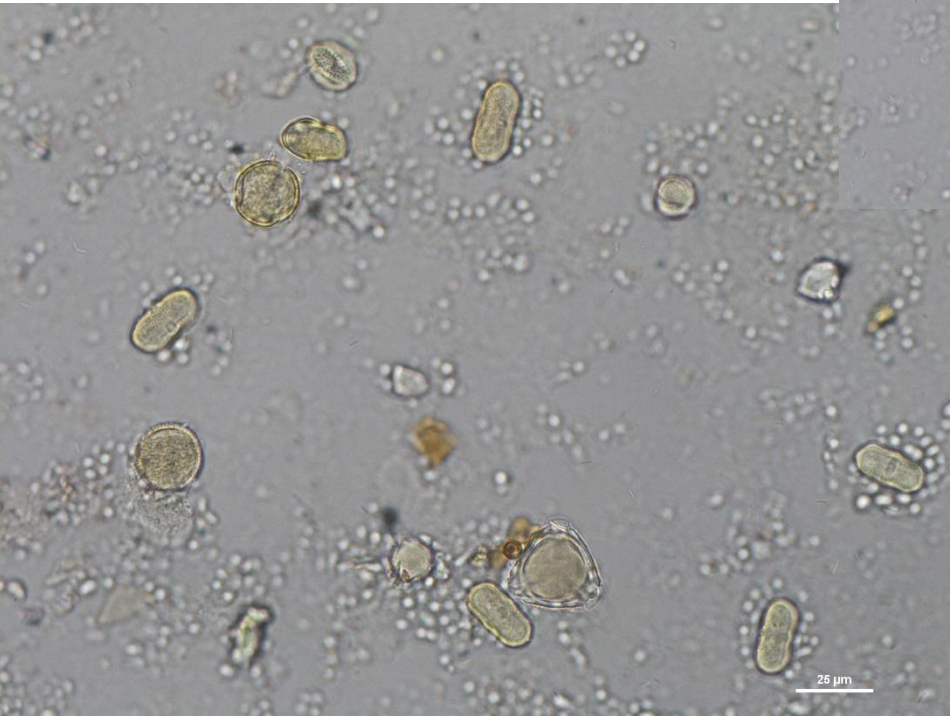
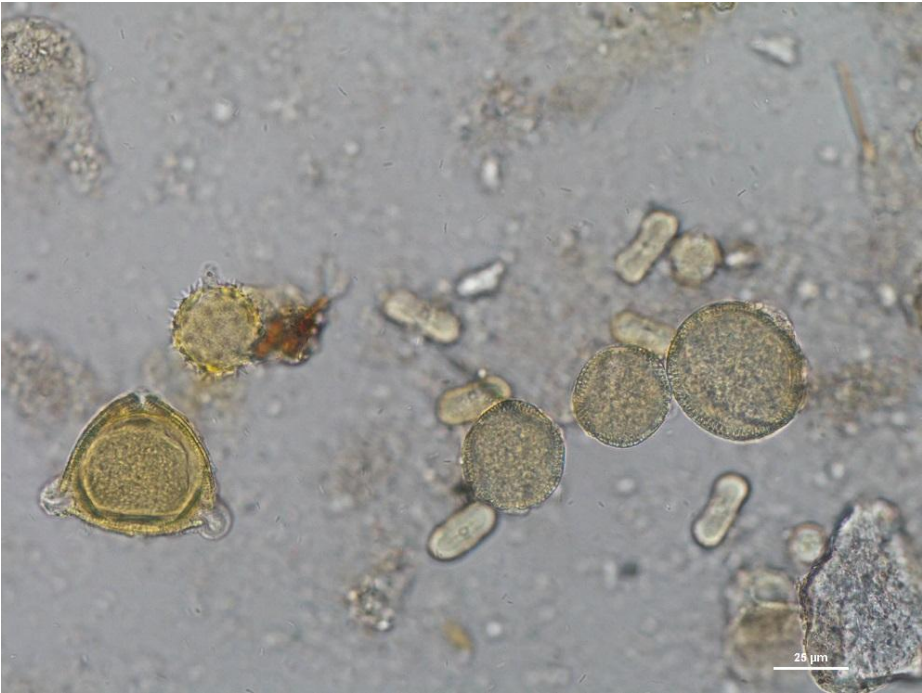
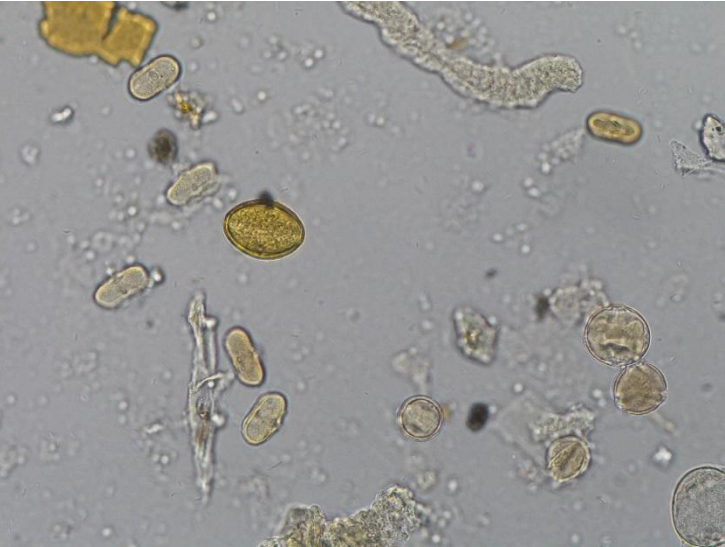
# Pollen Spectrum of Foeniculum Honeys



Actinidia-T, Anacardiaceae, Gleditsia-T, Caprifoliaceae, Chenopodiaceae, Artemisia, CarthamusTyp, Centaurea cyanus-T, Helianthus-T, Serratula-T, Taraxacum-T, Compositae, Convolvulaceae, Cornaceae, Brassica-T, Cruciferae, Citrullus, Cucumis, Elaeagnus, Ephedra, Castanea, Zea, Graminae, Labiatae, Astragalus, Galega, Onobrychis, Robinia, Trifolium-T, Vicia-T, Leguminosae, Malvaceae, Oleaceae, Sesamum, Fagopyrum, Rhamnaceae, Pyrus/Prunus-T, Rubus-T, Rosaceae, Solanaceae, Tamarix-T, Camellia, Tilia, Anthriscus-T, Coriandrum, Umbelliferae

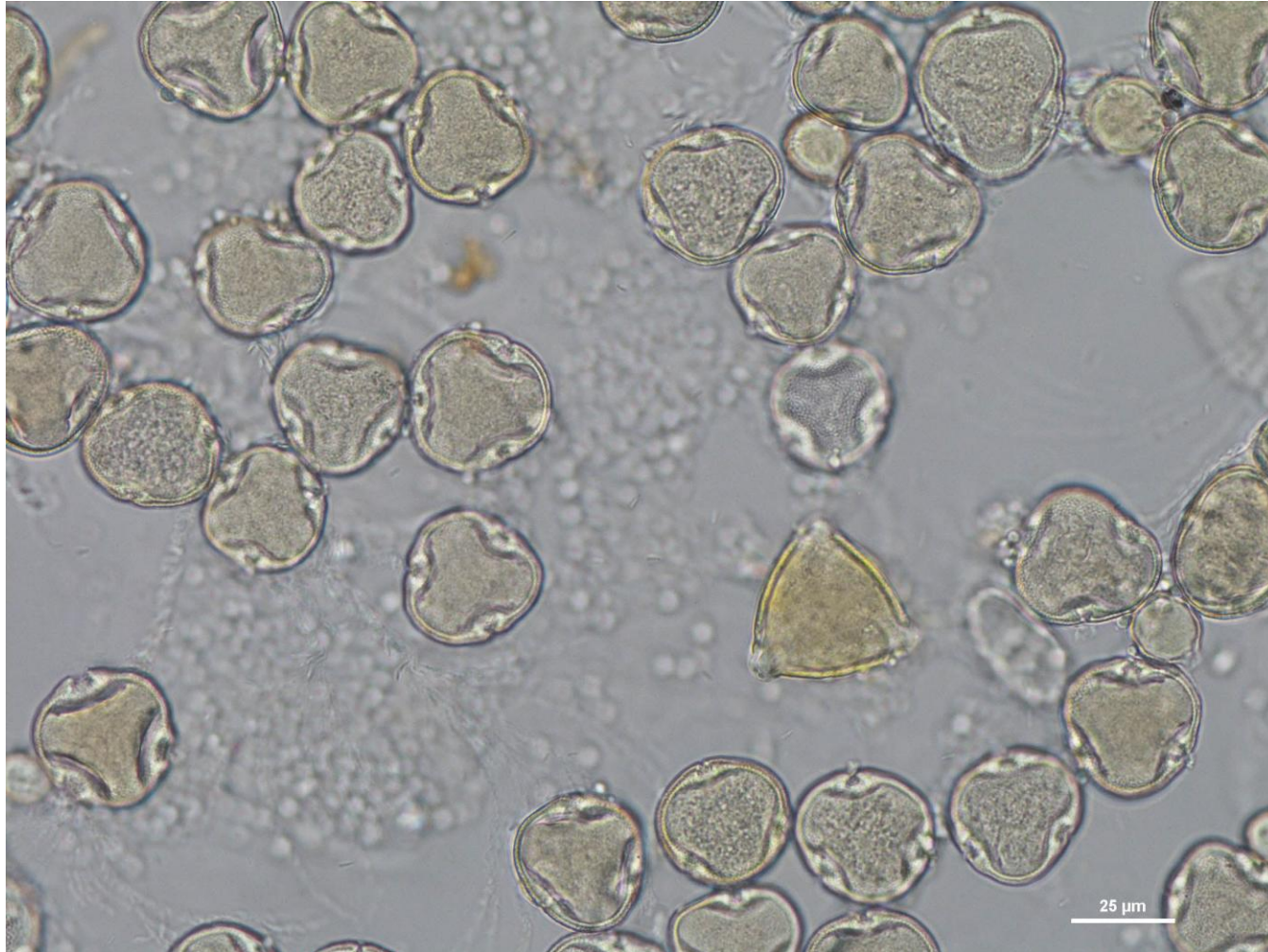


# Foeniculum (Fennel Honey)





# Tilia (Linden Honey)



Number of samples: 33

Years: 2009 - 2016

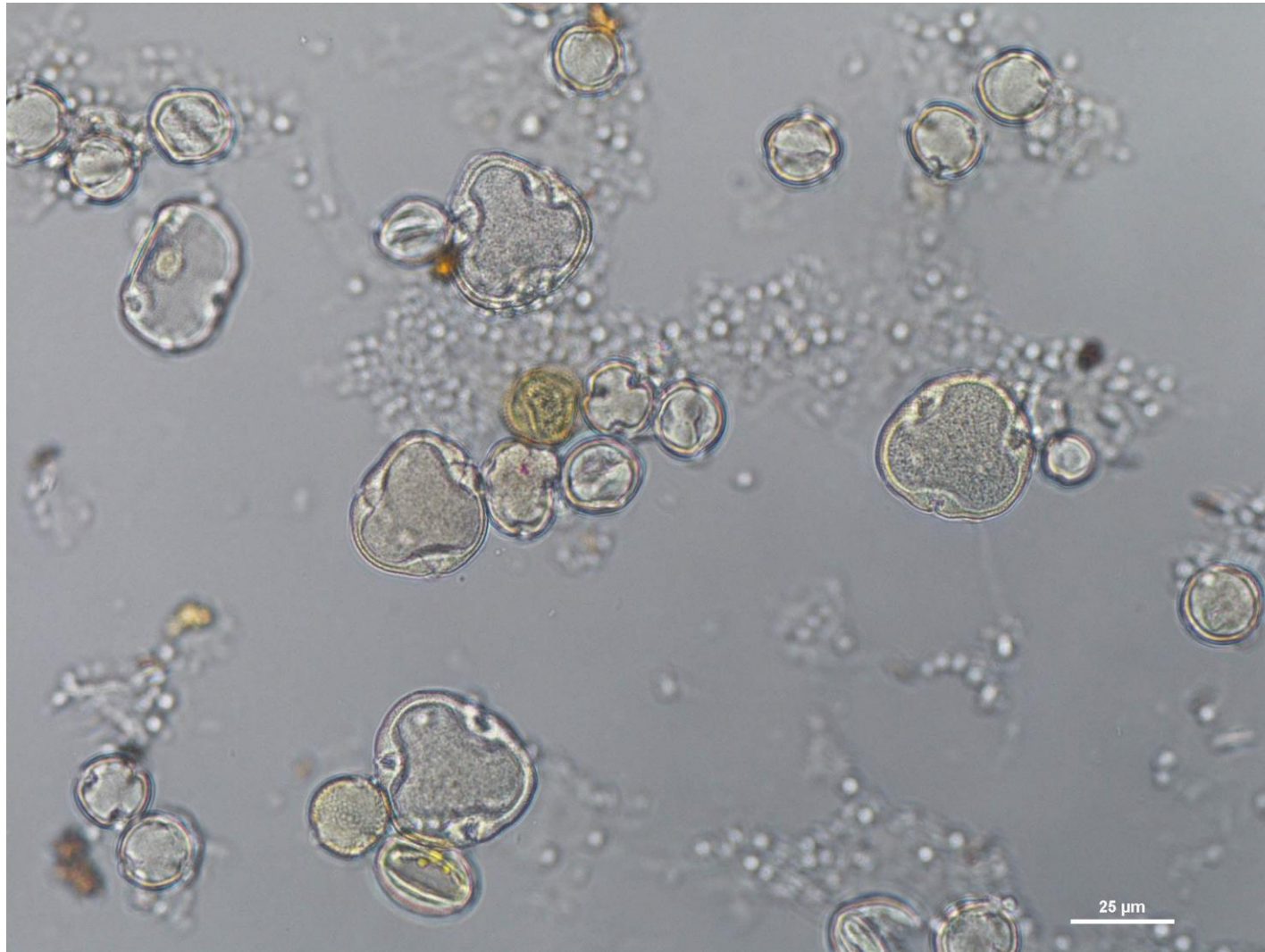
Physico-chemical parameter:

Electrical conductivity: mean 0.423 mS/cm  
(0.214 – 0.662 mS/cm)

# relative abundances of pollen in *Tilia* Honeys

> 45 %		> 15 x < 45 %		> 3 x < 15 %	
Actinidiaceae	Actinidia-T	Actinidiaceae	Actinidia-T	Aceraceae	Acer
Cruciferae		Cruciferae		Caesalpiniaceae	Gleditsia-T
Fagaceae	Castanea	Phyllanthaceae	Flueggea-T	Compositae	
Tiliaceae	Tilia	Tiliaceae	Tilia	Compositae	Helianthus Typ
		Verbenaceae	Vitex	Cruciferae	
				Fagaceae	Castanea
				Paulowniaceae	Paulownia-T
				Phyllanthaceae	Flueggea-T
				Polygonaceae	Fagopyrum
				Rosaceae	
				Tamaricaceae	Tamarix-T
				Umbelliferae	
				Verbenaceae	Vitex

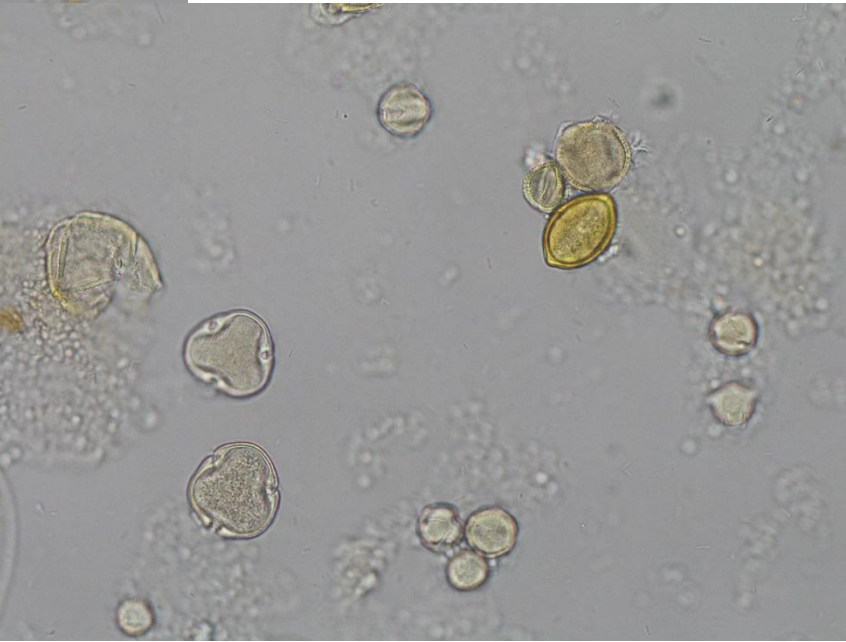
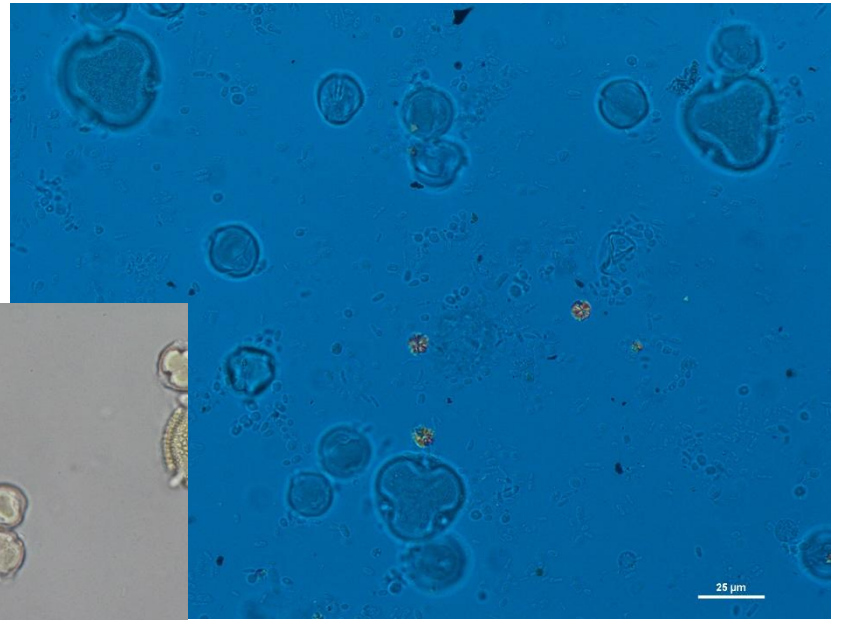
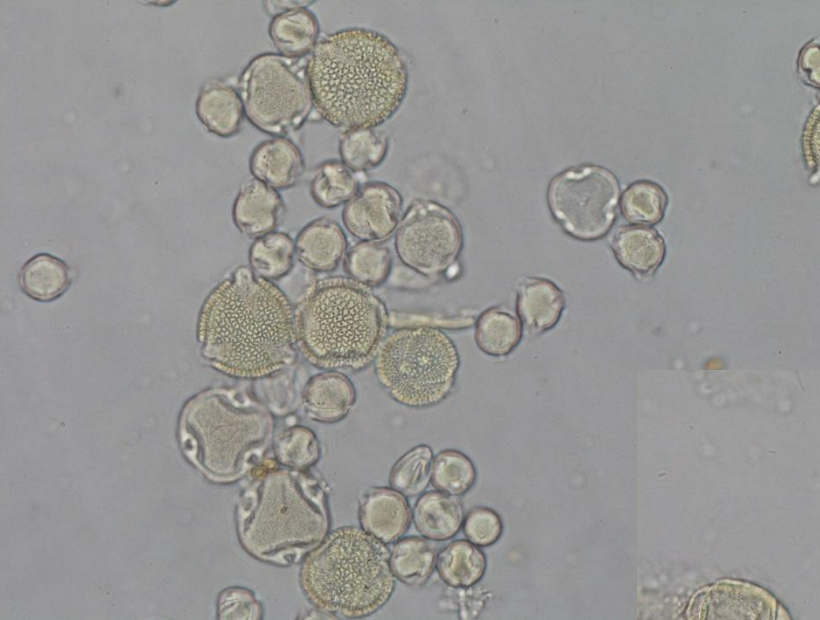
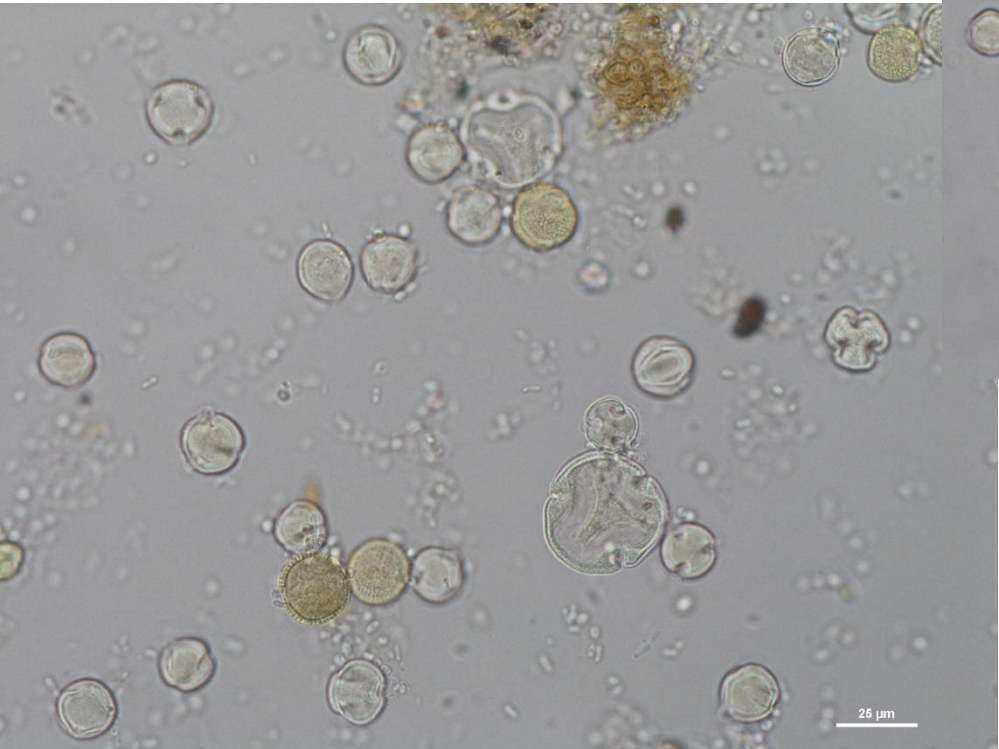
# Pollen Spectrum of Tilia Honeys



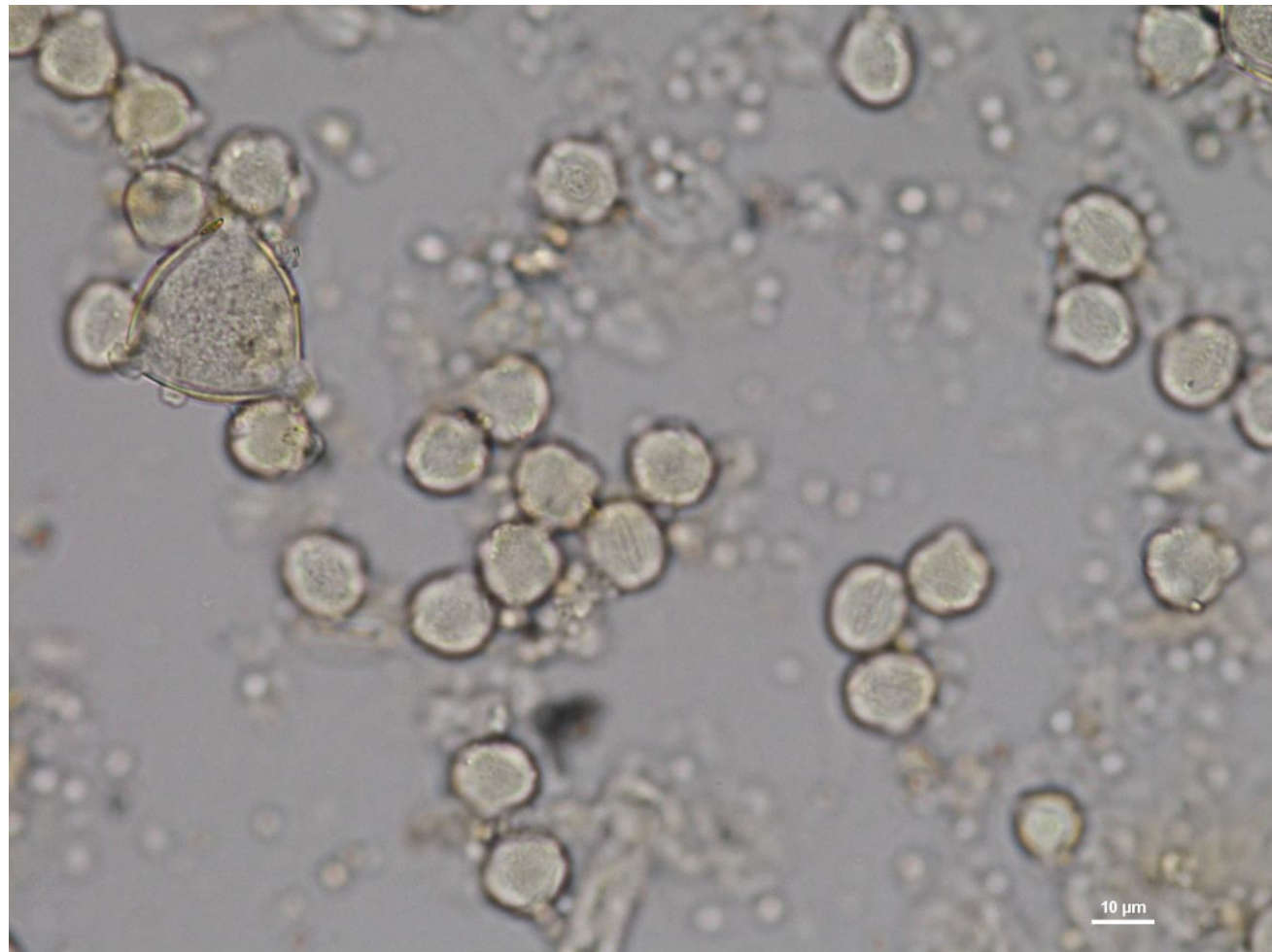
Acer, Actinidia-T, Araliaceae, Impatiens, Betulaceae, Gleditsia-T, Lonicera, Caprifoliaceae, Celastraceae, Chenopodiaceae, Artemisia, Helianthus-T, Taraxacum-T, Compositae, Convolvulaceae, Cornaceae, Crassulaceae, Cruciferae, Citrullus, Cucurbitaceae, Cyperaceae, Ephedra, Ericaceae, Castanea, Quercus, Zea, Graminae, Labiatae, Amorpha, Astragalus, Glycine-T, Robinia, Trifolium pratense-T, Trifolium repens-T, Trifolium-T, Vicia-T, Liliaceae, Acacia, Mimosa pudica-T, Davidia, Oleaceae, Onagraceae, Paulownia-T, Flueggea-T, Pinus, Pinaceae, Fagopyrum, Rumex, Rhamnaceae, Pyrus/Prunus-T, Rubus-T, Sanguisorba officinalis, Rosaceae, Citrus, Salix, Tamarix-T, Camellia, Theaceae, Foeniculum, Umbelliferae, Vitex, Parthenocissus, Tribulus



# Tilia (Linden Honey)



# Astragalus (Milkvetch Honey)



Number of samples: 2

Years: 2012

Physico-chemical parameter:

Electrical conductivity: mean 0.194 mS/cm

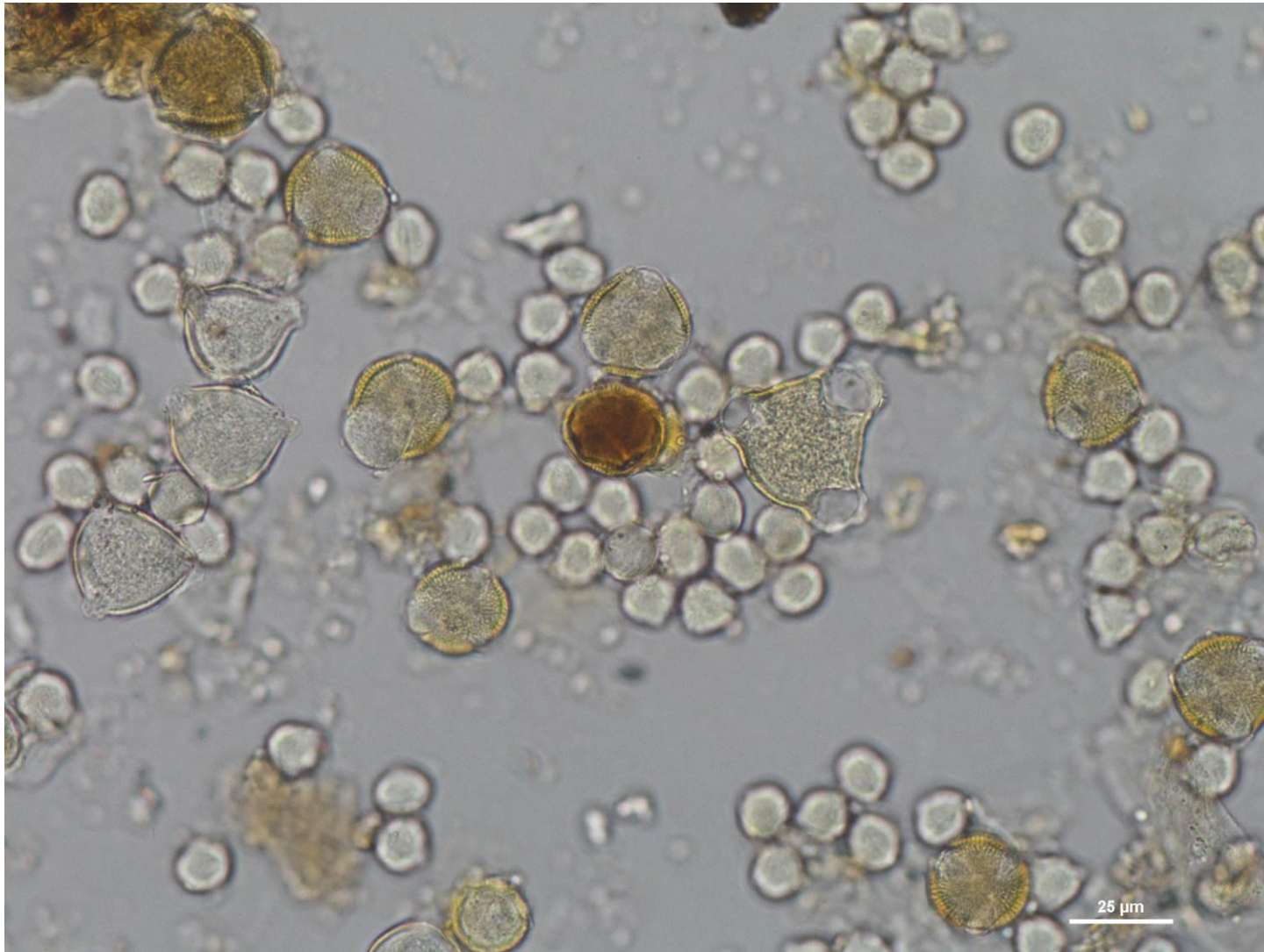
(0.175 – 0.212 mS/cm)

# relative abundances of pollen in *Astragalus* Honeys

> 45 %	> 15 x < 45 %	> 3 x < 15 %
Leguminosae    Astragalus	---	Cruciferae Salicaceae        Salix

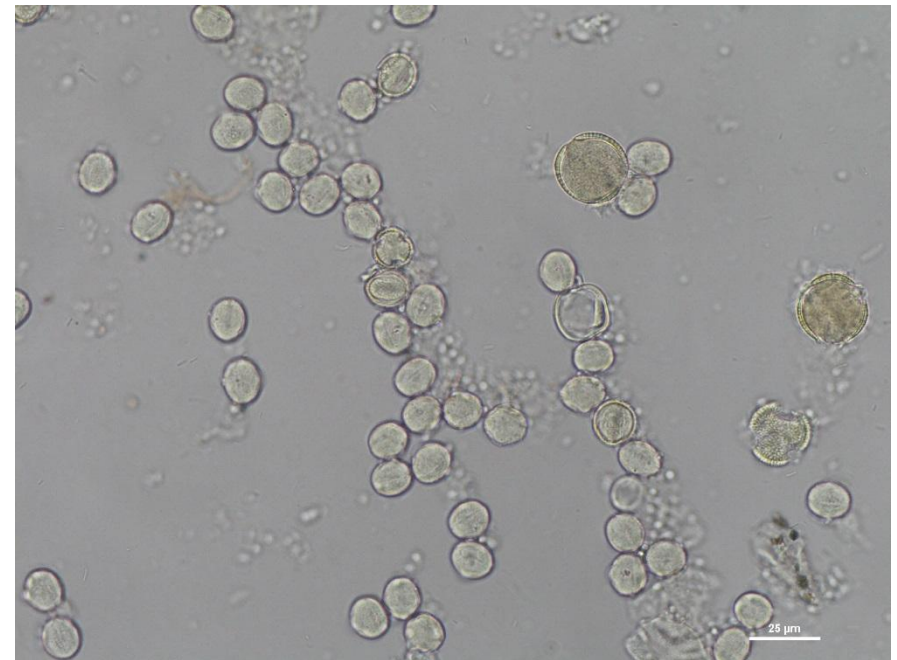
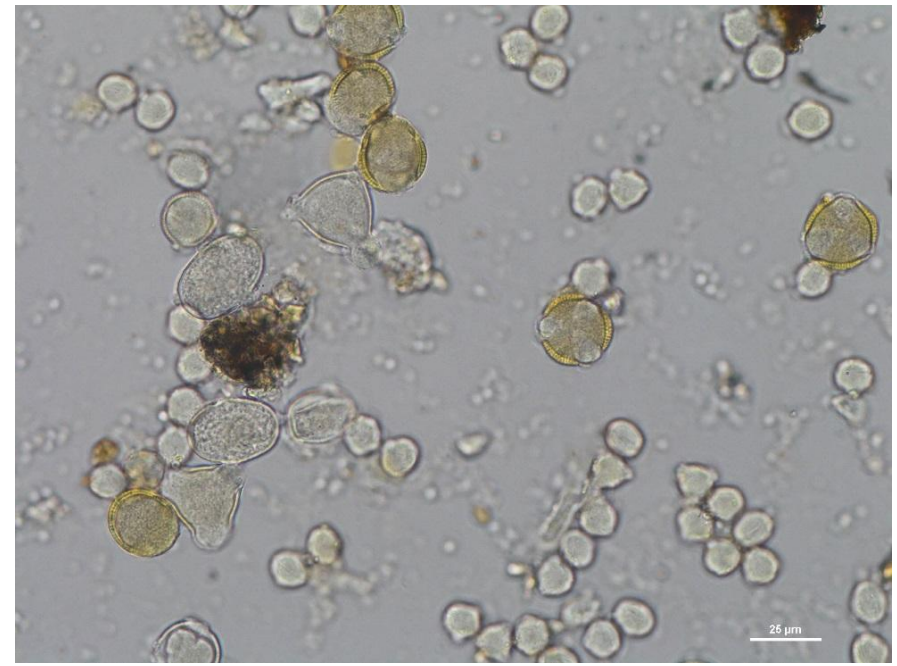


# Pollen Spectrum of Astragalus Honeys



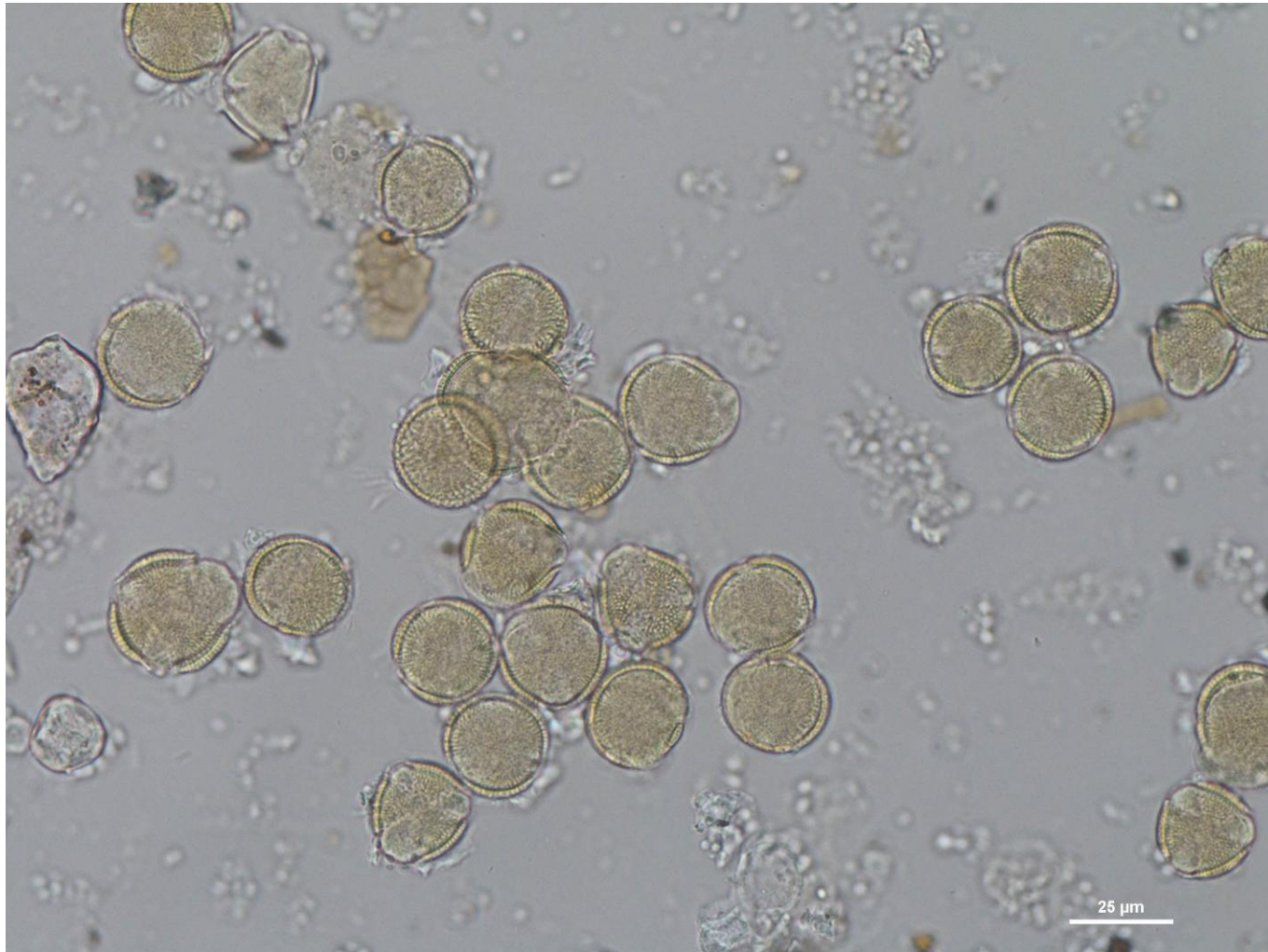
Gleditsia-T, Caprifoliaceae, Cruciferae,  
Quercus, Robinia, Trifolium-T, Vicia-T,  
Fagopyrum, Salix

# Astragalus (Milkvetch Honey)





# Brassica (Rape Honey)



Number of samples: 10

Years: 2010/12/13/15

Physico-chemical parameter:

Electrical conductivity: mean 0.159 mS/cm

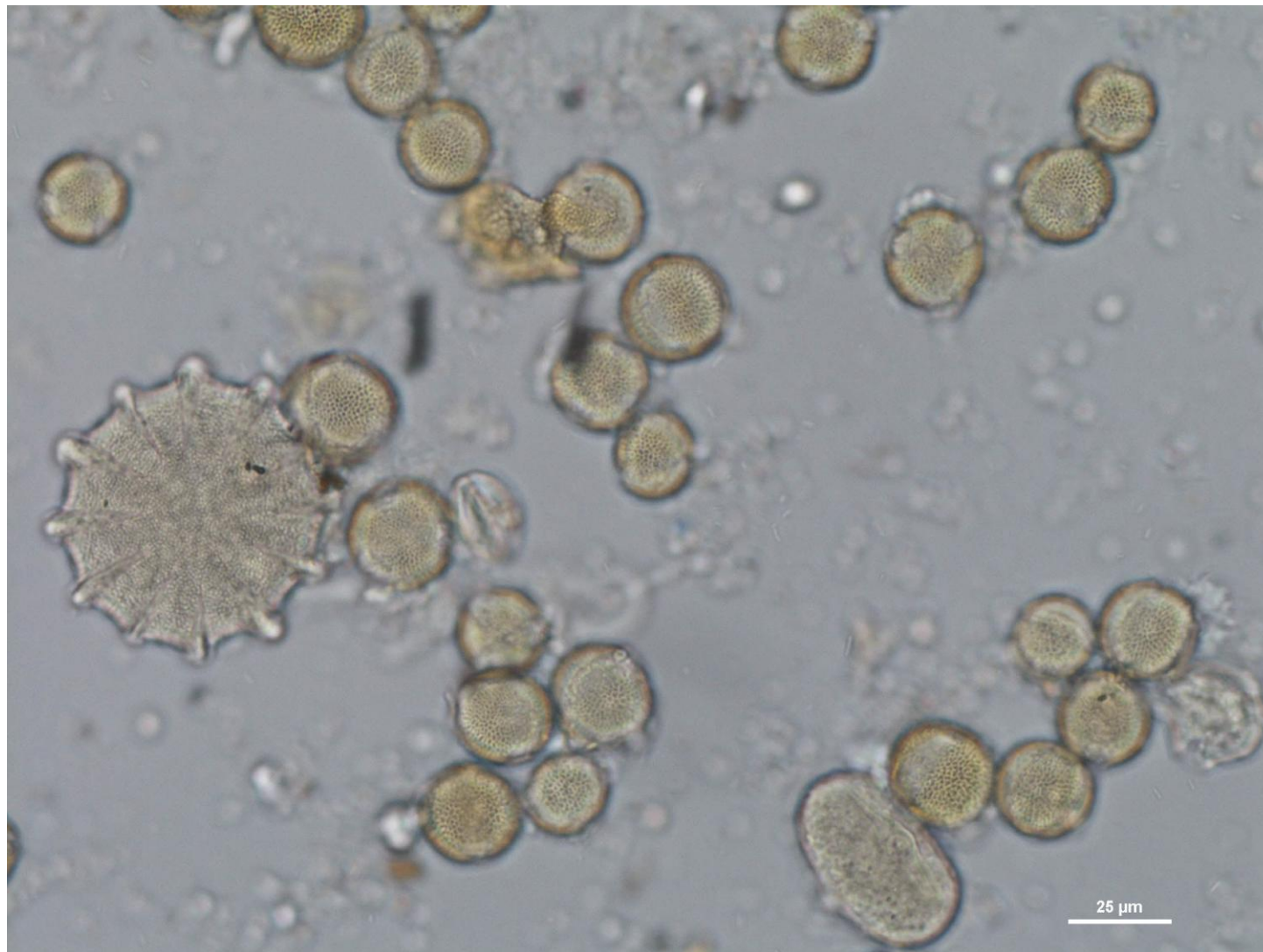
(0.133 – 0.196 mS/cm)



# relative abundances of pollen in Brassica Honey

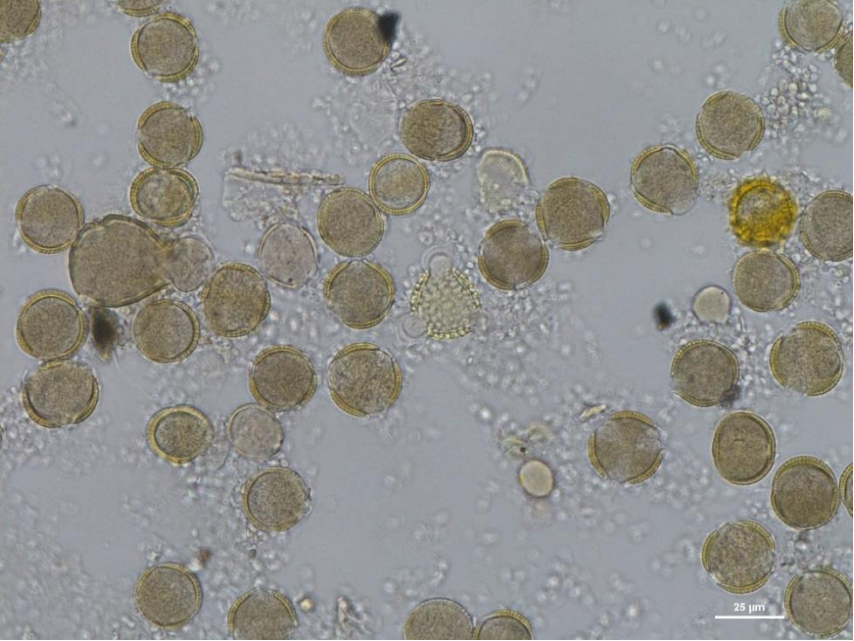
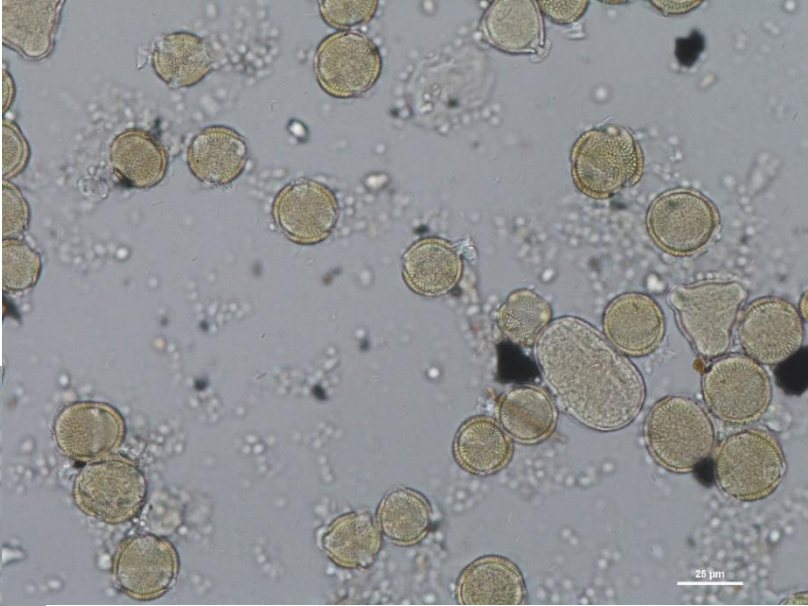
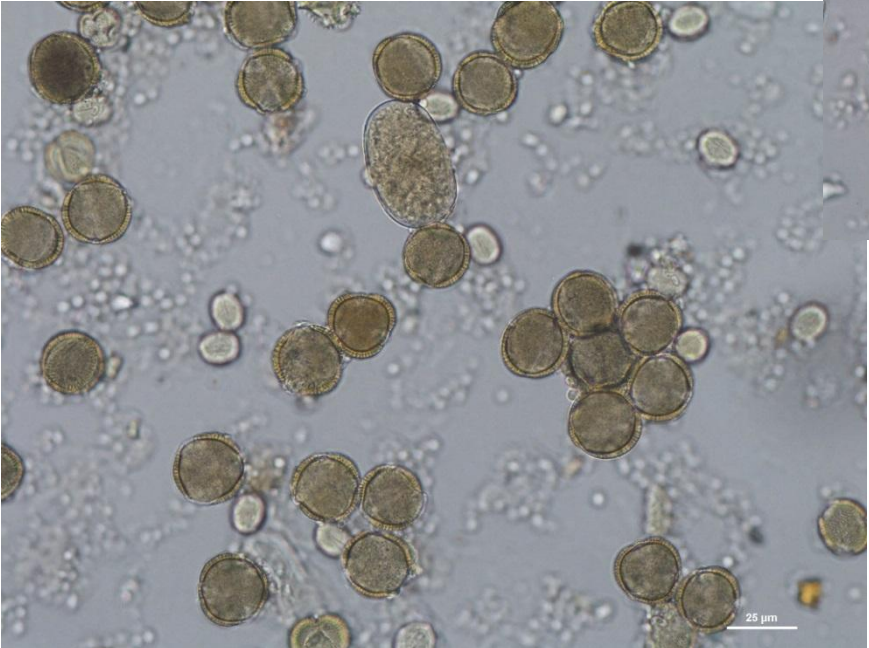
> 45 %		> 15 x < 45 %		> 3 x < 15 %	
Cruciferae	Brassica	Leguminosae	Astragalus	Leguminosae	Vicia-T
				Rosaceae	Pyrus/Prunus-T
				Verbenaceae	Vitex

# Pollen Spectrum of Brassica Honeys



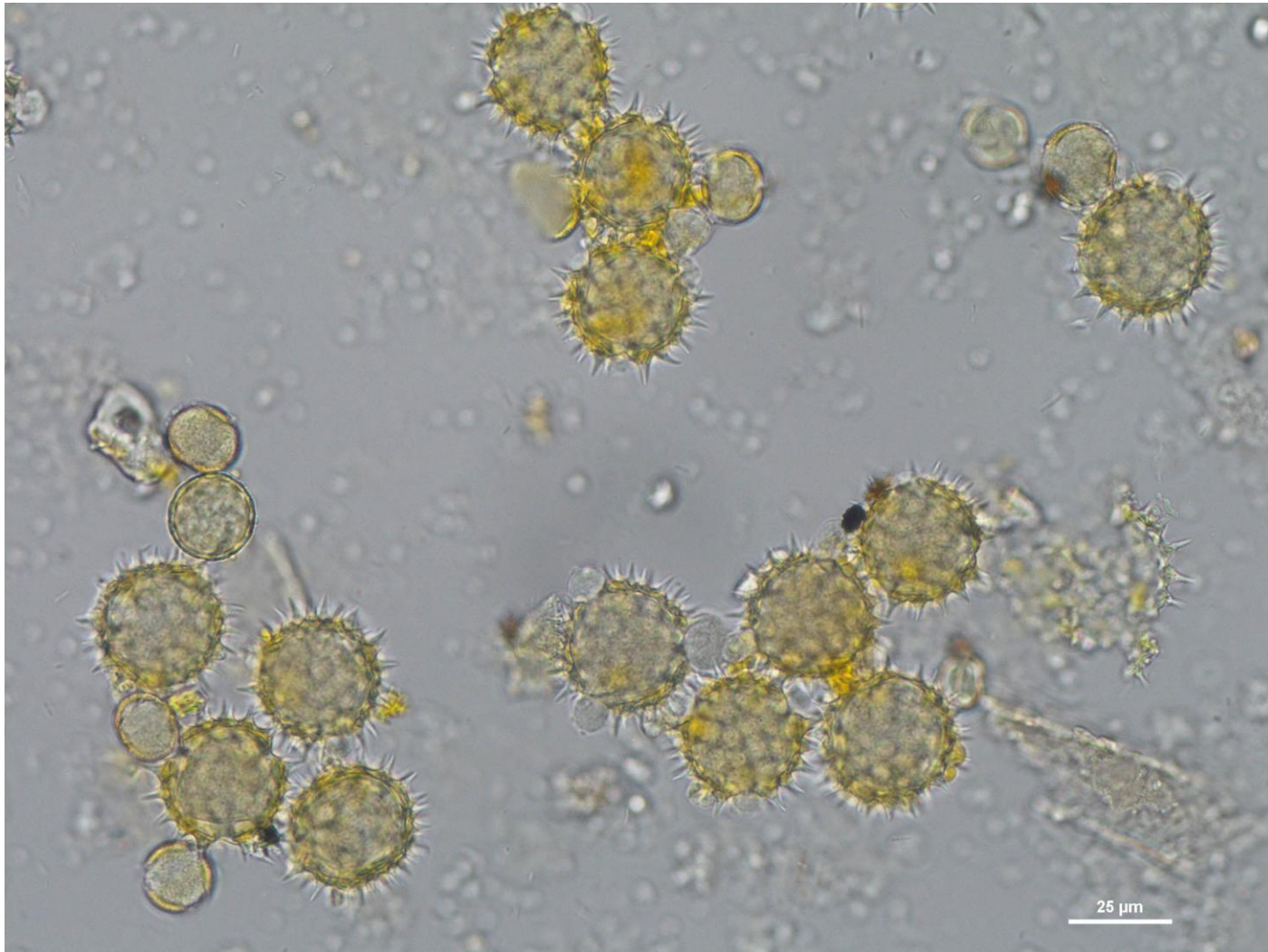
Betulaceae, Caesalpiniaceae,  
Caryophyllaceae, Artemisia, Achillea,  
Helianthus-T, Taraxacum-T,  
Compositae, Convolvulaceae,  
Citrullus, Cucurbita, Quercus, Zea,  
Graminae, Labiatae, Astragalus,  
Robinia, Vicia-T, Leguminosae,  
Davidia, Papaveraceae, Sesamum,  
Pinus, Pinaceae, Fagopyrum,  
Pyrus/Prunus-T, Rubus- T, Galium-T,  
Salix, Camellia, Coriandrum, Vitex

# Brassica (Rape Honey)





# Helianthus (Sunflower Honey)



Number of samples: 13

Years: 2011 - 2015

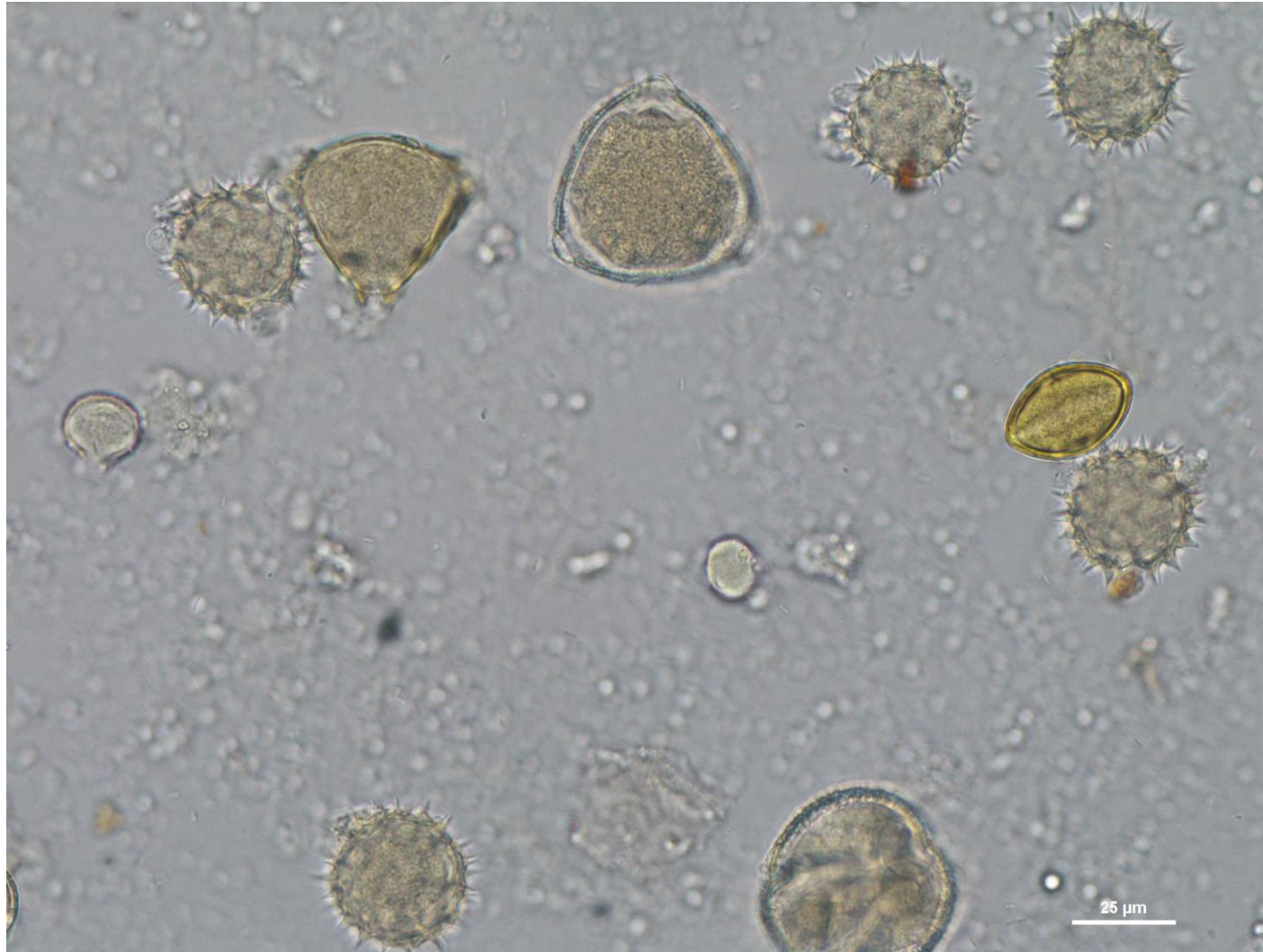
Physico-chemical parameter:

Electrical conductivity: mean 0.276 mS/cm  
(0.160 – 0.488 mS/cm)

# relative abundances of pollen in Helianthus Honeys

> 45 %		> 15 x < 45 %		> 3 x < 15 %	
Compositae	Helianthus-T	Compositae	Helianthus-T	Compositae	
		Cruciferae		Cruciferae	
		Chenopodiaceae		Cucurbitaceae	Citrullus
				Ephedraceae	Ephedra
				Leguminosae	Lotus

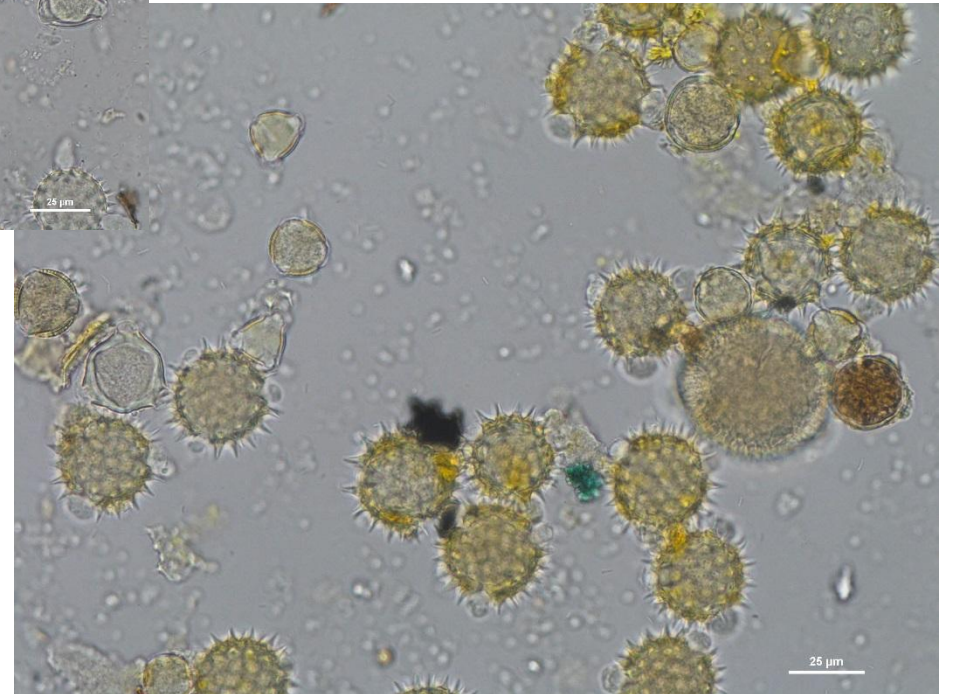
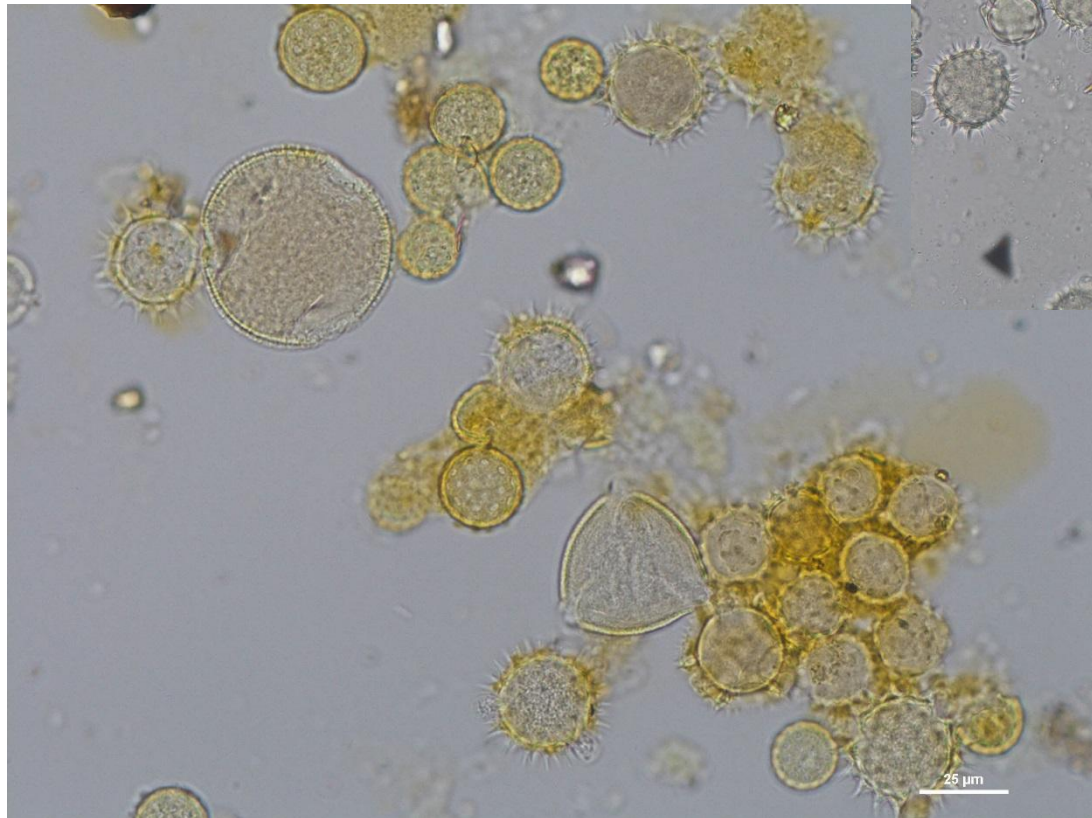
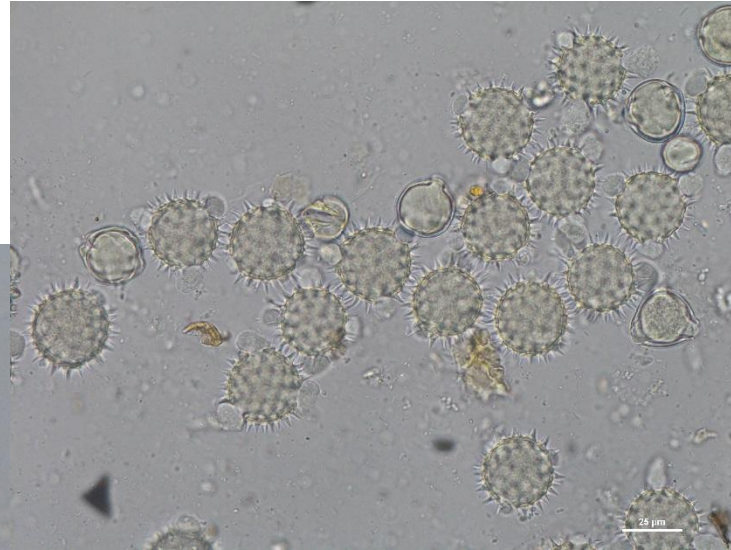
# Pollen Spectrum of Helianthus Honeys



Actinidia-T, Anacardiaceae,  
Chenopodiaceae, Crassulaceae,  
Artemisia, Carthamus-T, Helianthus-T,  
Taraxacum-T, Xanthium-T,  
Compositae, Cucumis, Cruciferae,  
Citrullus, Cucurbitaceae, Cyperaceae,  
Elaeagnus, Ephedra, Zea, Graminae,  
Labiatae, Astragalus, Lotus,  
Onobrychis, Trifolium pratense-T,  
Trifolium-T, Vicia-T, Leguminosae,  
Liliaceae, Fagopyrum, Pyrus/Prunus-T,  
Rubus-T, Solanaceae, Tamarix-T, Tilia,  
Umbelliferae, Tribulus



# Helianthus (Sunflower Honey)



# Vitex honey



## Physico/chemical data:

Color : 15 mm Pfund

Moisture: 17,9 %

Electrical conductivity: average 0.132 mS/cm  
(0.124 - 0.175 mS/cm)

## Pollen spectrum:

Density: medium

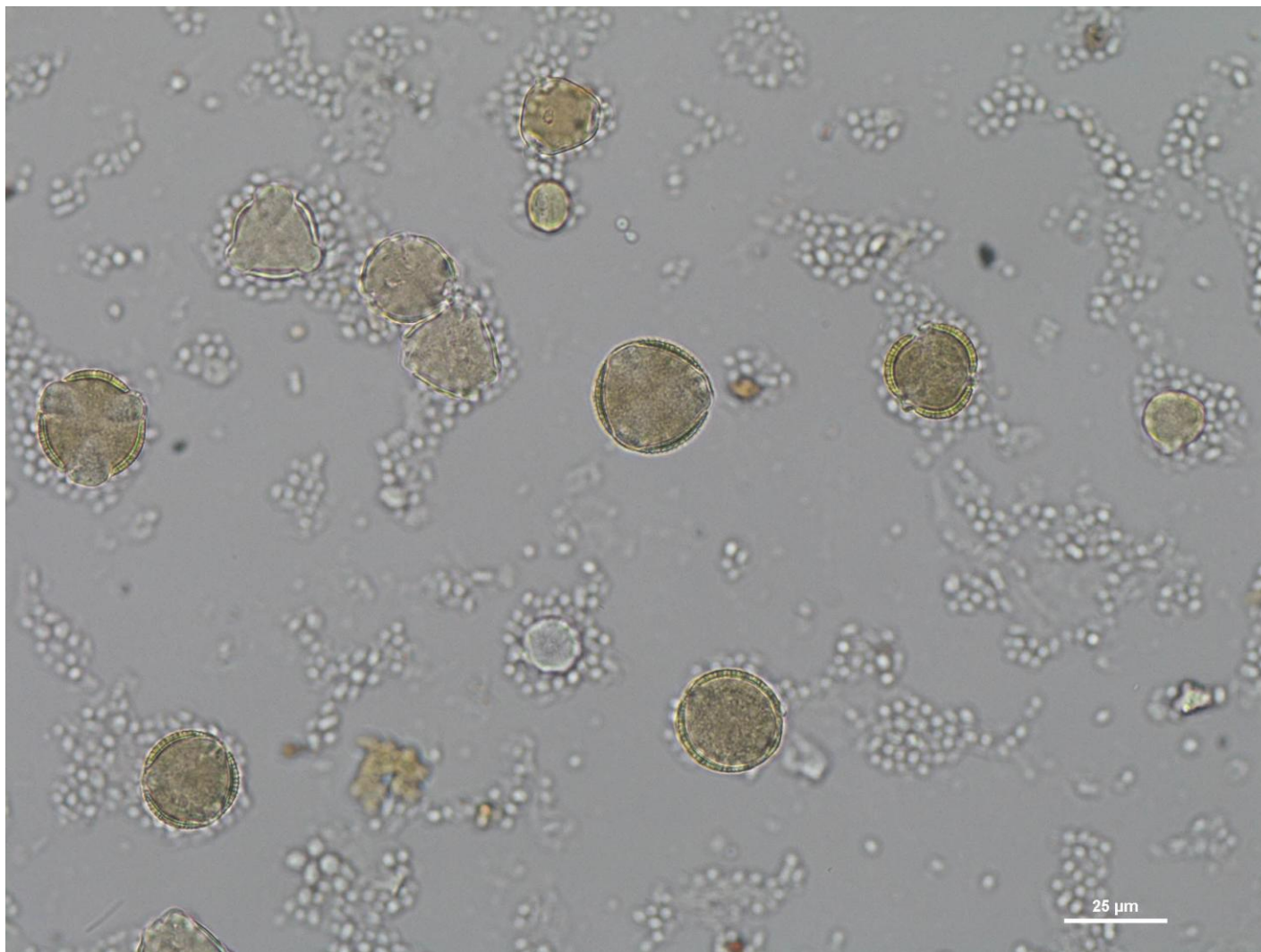
Vitex >45% -> 60%

15%<Vitex>45% -> 40%

Other pollen types: Astragalus, Lonicera, Celastraceae, Rosaceae, Pinus, Vicia, Asteraceae Type, Catalpa, Actinidia, Helianthus, Rhamnaceae, Quercus, Rubus, Chenopodiaceae, Poaceae, Robinia, Humulus, Cornus, Carduus, Fagopyrum, Caesalpiniaceae, Castaneae, Apiaceae, Tamarix, Flueggea, Spireae, Eurya, Papaveraceae



# Vitex Honey



Number of samples: 243

Years: 2010 - 2016

Physico-chemical parameter:

Electrical conductivity: mean 0.180 mS/cm

(0.097 – 0.363 mS/cm)

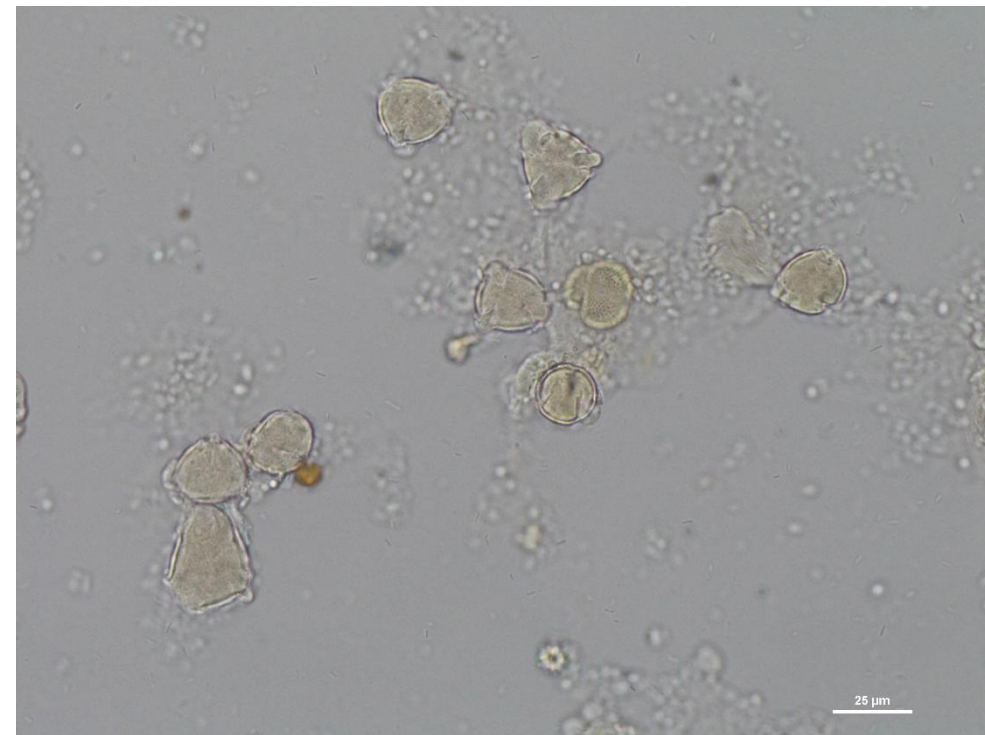


# relative abundances of pollen in *Vitex* Honeys

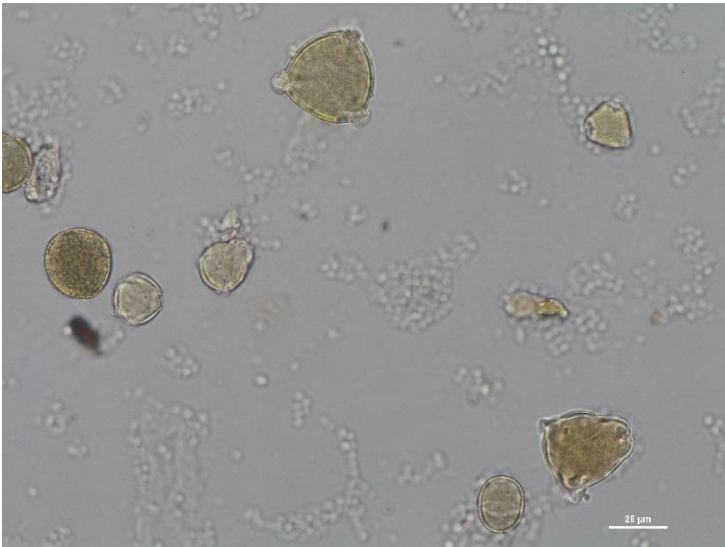
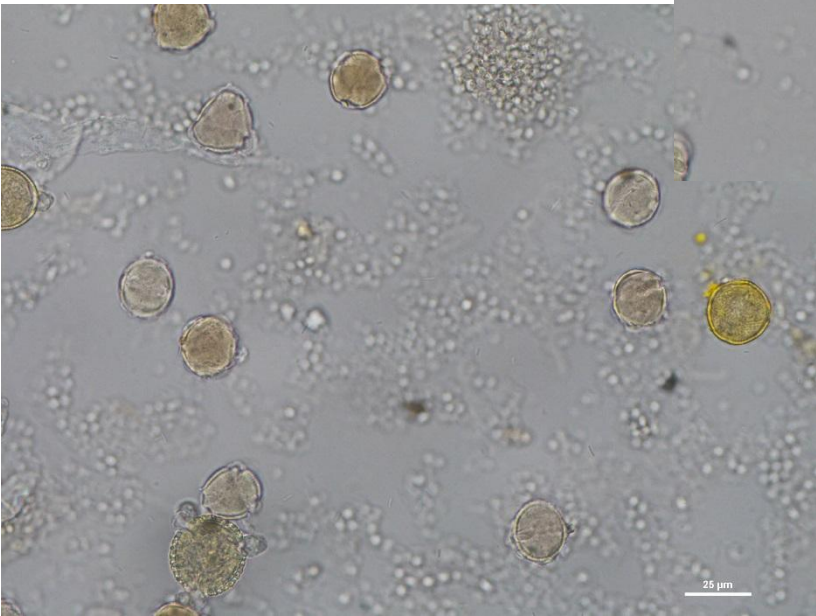
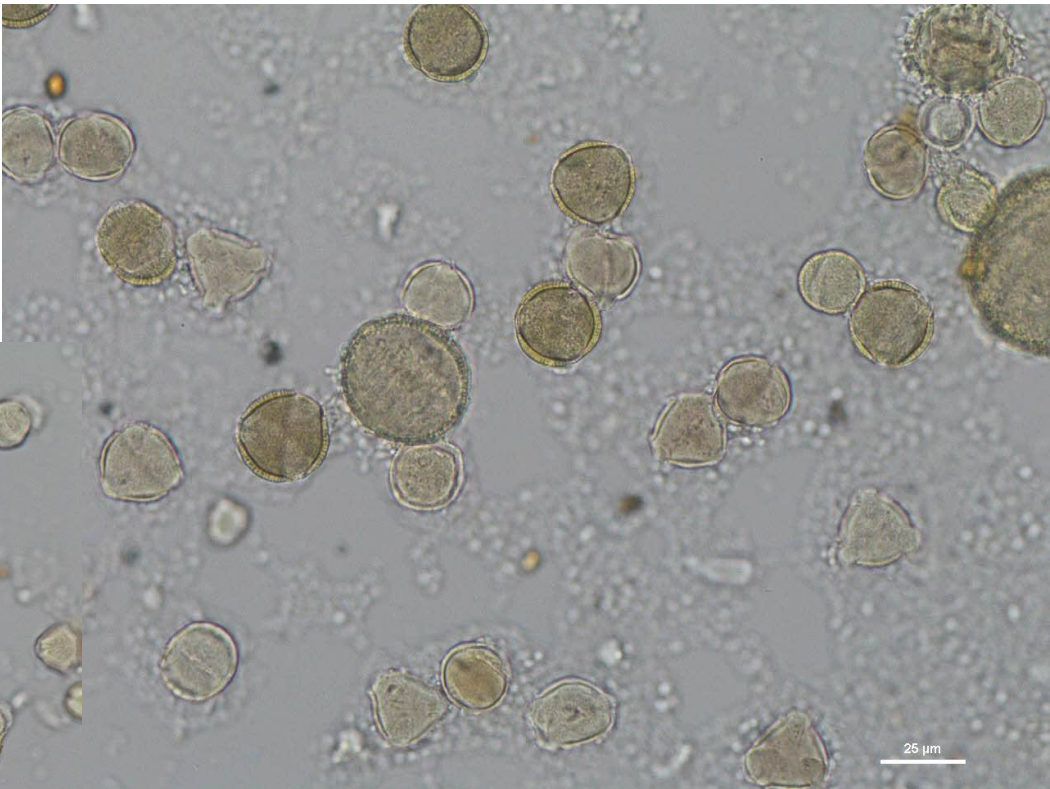
> 45 %		> 15 x < 45 %		> 3 x < 15 %	
Fagaceae	Castanea	Caesalpiniaceae	Gleditsia-T	Anacardiaceae	
Verbenaceae	Vitex	Combretaceae		Caesalpiniaceae	Gleditsia-T
		Cruciferae		Caesalpiniaceae	
		Fagaceae	Castanea	Compositae	Helianthus-T
		Rhamnaceae		Compositae	Taraxacum-T
		Verbenaceae	Vitex	Compositae	
				Cruciferae	
				Fagaceae	Castanea
				Leguminosae	Astragalus
				Phyllanthaceae	Flueggea-T
				Polygonaceae	Fagopyrum
				Rosaceae	
				Rosaceae	Pyrus/Prunus-T
				Rhamnaceae	
				Salicaceae	Salix
				Theaceae	Camellia
				Umbelliferae	

# Pollen Spectrum of Vitex Honeys

Actinidia-T, Anacardiaceae, Araliaceae, Betulaceae, Catalpa, Gleditsia-T, Caesalpiniaceae, Lonicera, Caprifoliaceae, Caryophyllaceae, Celastraceae, Chenopodiaceae, Commelinaceae, Achillea-T, Arctium-T, Artemisia, Aster-T, Centaurea cyanus-T, Centaurea jacea-T, Helianthus-T, Serratula-T, Taraxacum-T, Xanthium-T, Compositae, Convolvulaceae, Cornaceae, Sedum-T, Crassulaceae, Brassica-T, Cruciferae, Citrullus, Cucumis, Cucurbita, Cucurbitaceae, Cyperaceae, Elaeagnus, Ephedra, Erica-T, Ericaceae, Euphorbiaceae, Castanea, Quercus, Zea, Graminae, Labiatae, Lauraceae, Amorpha, Astragalus, Lotus, Onobrychis, Robinia, Trifolium repens-T, Trifolium-T, Vicia-T, Leguminosae, Liliaceae, Malvaceae, Acacia, Leucaena-T, Mimosa pudica-T, Eucalyptus-T, Myrtaceae, Davidia, Ligustrum-T, Oleaceae, Palmae, Papaver-T, Papaveraceae, Paulownia-T, Sesamum, Flueggea-T, Pinus, Pinaceae, Fagopyrum, Polygonum, Polygonaceae, Ranunculaceae, Rhamnaceae, Pyrus/Prunus-T, Rubus-T, Sanguisorba officinalis-T, Rosaceae, Citrus, Salix, Sapindaceae, Saxifragaceae, Ailanthus, Tamarix-T, Taxus, Camellia, Tilia, Anthriscus-T, Foeniculum, Umbelliferae, Parthenocissus, Vitis, Vitaceae, Tribulus

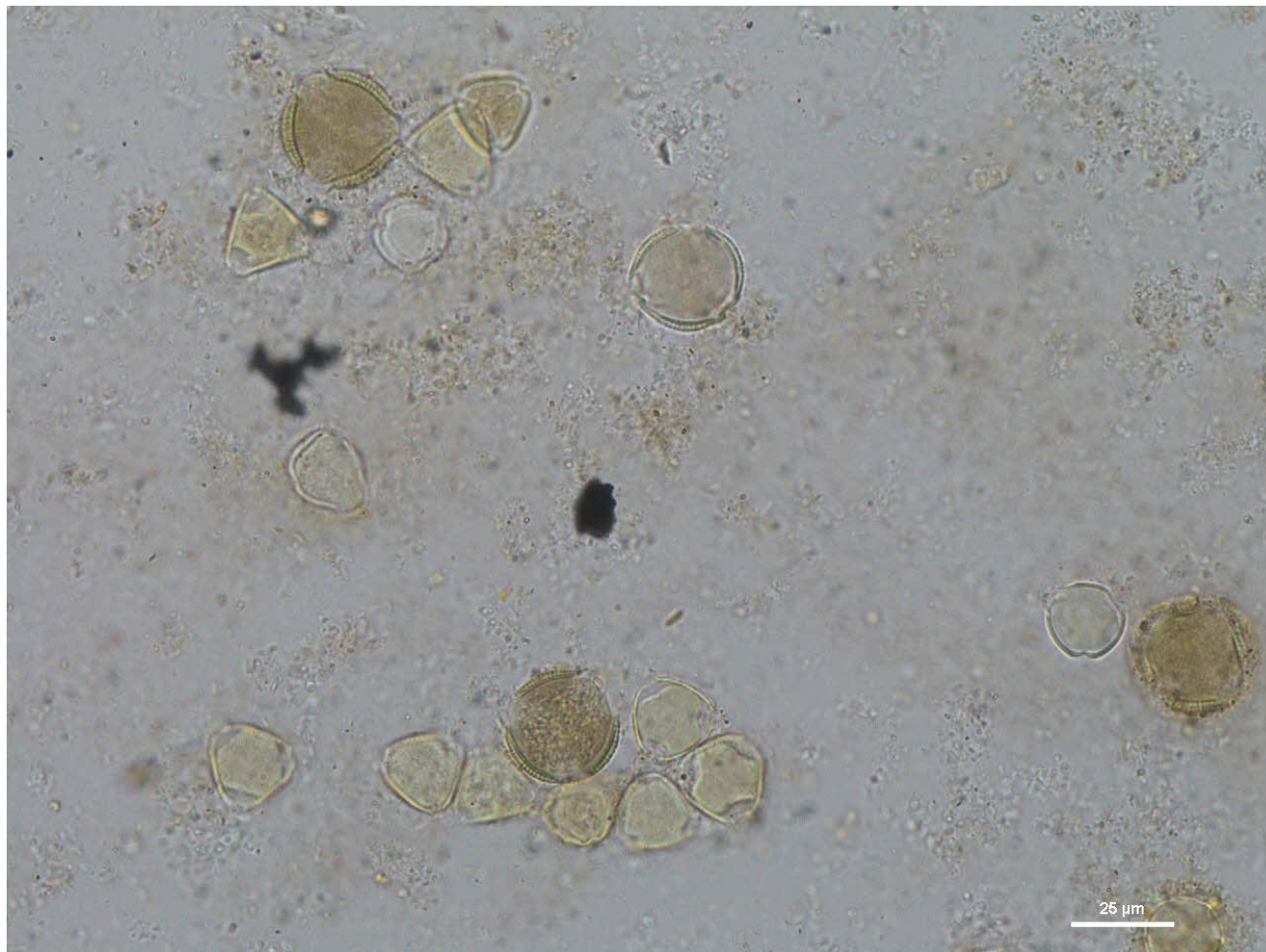


# Vitex Honey





# Ziziphus (Jujube Honey)



Number of samples: 14

Years: 2013 - 2015

Physico-chemical parameter:

Electrical conductivity: mean 0.345 mS/cm  
(0.239 – 0.480 mS/cm)

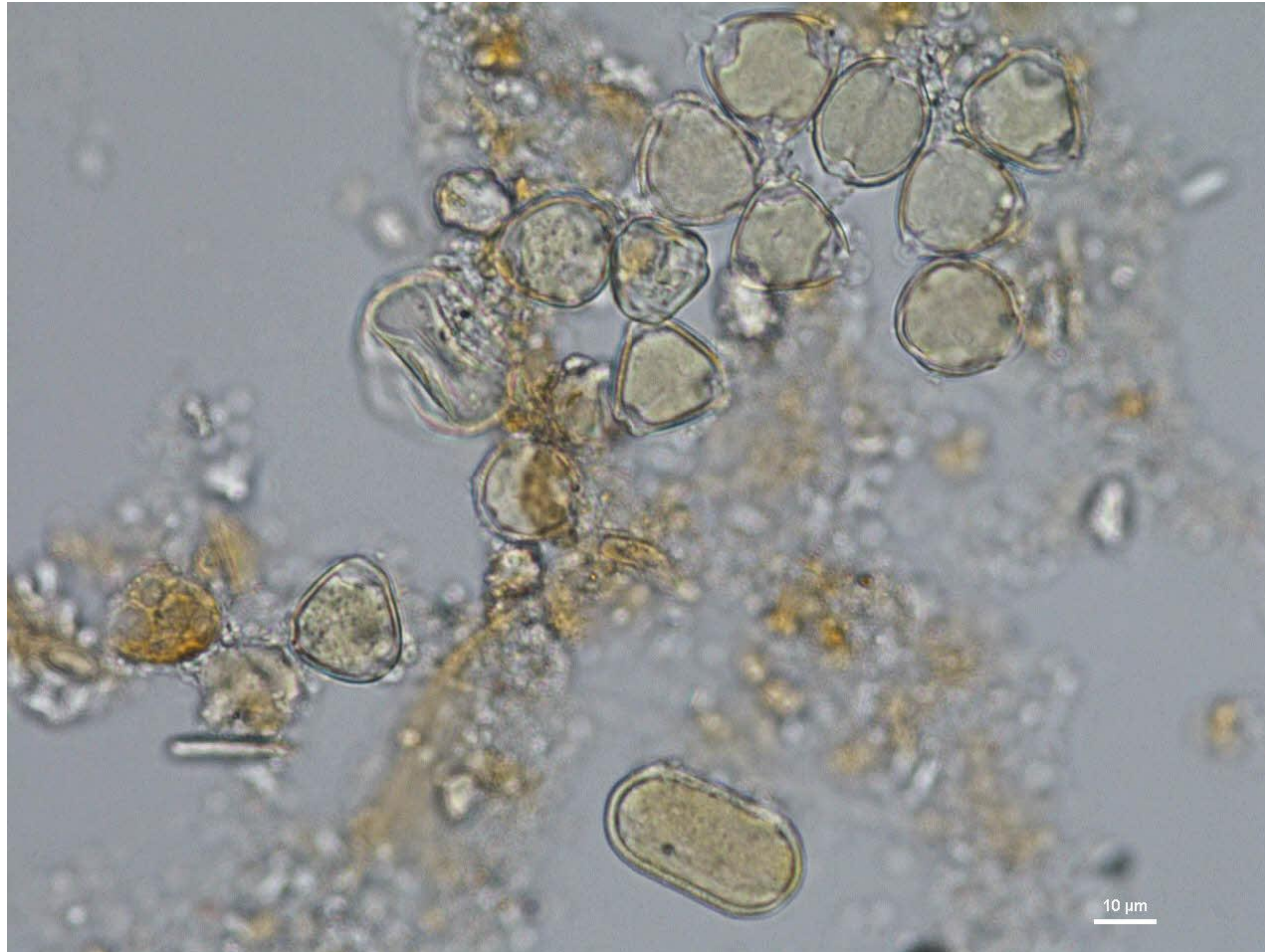
High pH value

For more information see: Zhou et al.;  
Jujube Honey from China:  
Physicochemical Characteristics and  
Mineral Contents; Journal of Food  
Science 78(3):C387-94 · March 2013

# relative abundances of pollen in Ziziphus Honeys

<b>&gt; 45 %</b>	<b>&gt; 15 x &lt; 45 %</b>	<b>&gt; 3 x &lt; 15 %</b>
Rhamnaceae Ziziphus jujuba-T	Cruciferae	Cruciferae Polygonaceae Fagopyrum

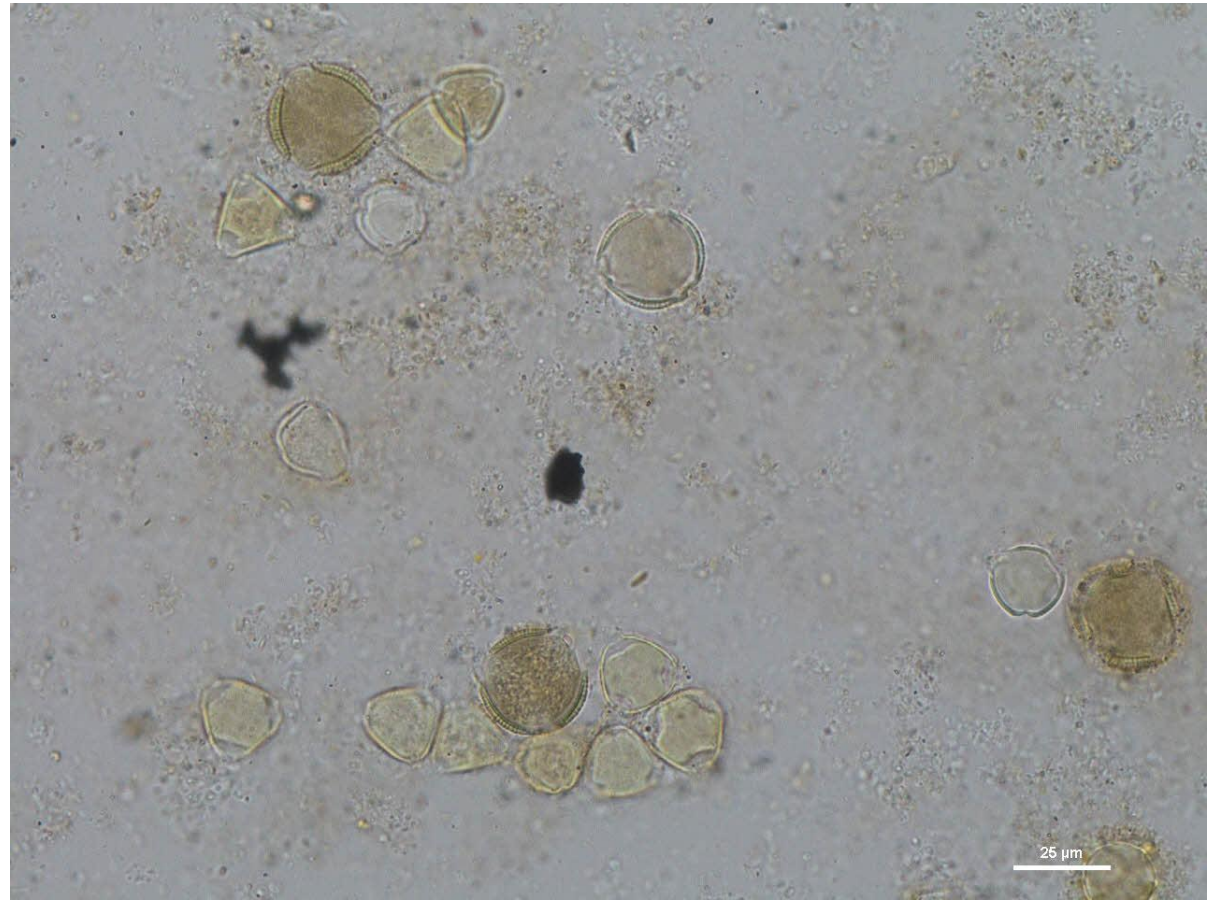
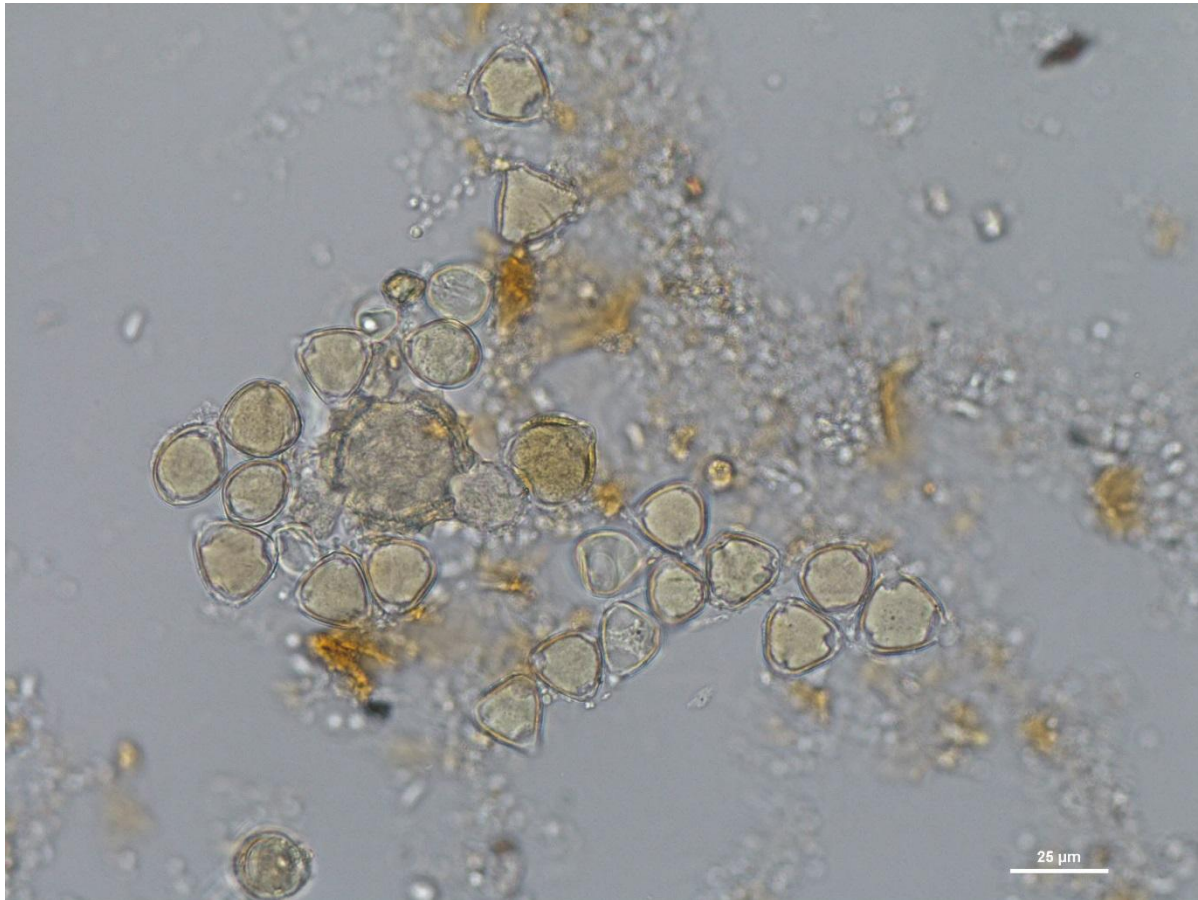
# Pollen Spectrum of Ziziphus Honeys



Actinidia-T, Anacardiaceae, Aquifoliaceae, Betulaceae, Caprifoliaceae, Chenopodiaceae, Arctium-T, Helianthus-T, Serratula-T, Taraxacum-T, Compositae, Convolvulaceae, Cornaceae, Cruciferae, Citrullus, Cyperaceae, Euphorbiaceae, Castanea, Zea, Graminae, Labiatae, Aeschynomene, Astragalus, Onobrychis, Robinia, Trifolium-T, Vicia-T, Acacia, Mimosa pudica-T, Palmae, Pinaceae, Fagopyrum, Rhamnaceae, Pyrus/Prunus-T, Rubus-T, Rosaceae, Ailanthus, Camellia, Tilia, Umbelliferae, Tribulus



# Ziziphus (Jujube Honey)



## II. Polyflora Honey



### Physico/chemical data:

Color : 25 mm Pfund

Moisture: 17.8 %

Electrical conductivity: average 0.230 mS/cm  
(0.130 – 0.288 mS/cm)

### Pollen spectrum:

Density: medium/ high

Brassicaceae >45% -> 74%

Vitex>45%-> 8% (F/G and taste ≠ monofloral)

15%<Brassicaceae-Vitex>45% -> 10%

15%<Brassicaceae-Apiaceae>45% -> 4%

15%<Brassicaceae-Helianthus>45% -> 1%

15%<Brassicaceae-Astragalus>45% -> 6%

Other pollen types: Astragalus, Lonicera, Celastraceae, Rosaceae, Pinus, Vicia, Asteraceae Type, Catalpa, Actinidia, Helianthus, Rhamnaceae, Quercus, Rubus, Chenopodiaceae, Poaceae, Robinia, Humulus, Cornus, Carduus, Fagopyrum, Caesalpiniaceae, Castaneae, Apiaceae, Tamaris, Flueggea, Juglandaceae, Artemisa, Epilobe, Spireae, Eurya, Pseuderanthemum, Amorpha, Salix, Papaveraceae...

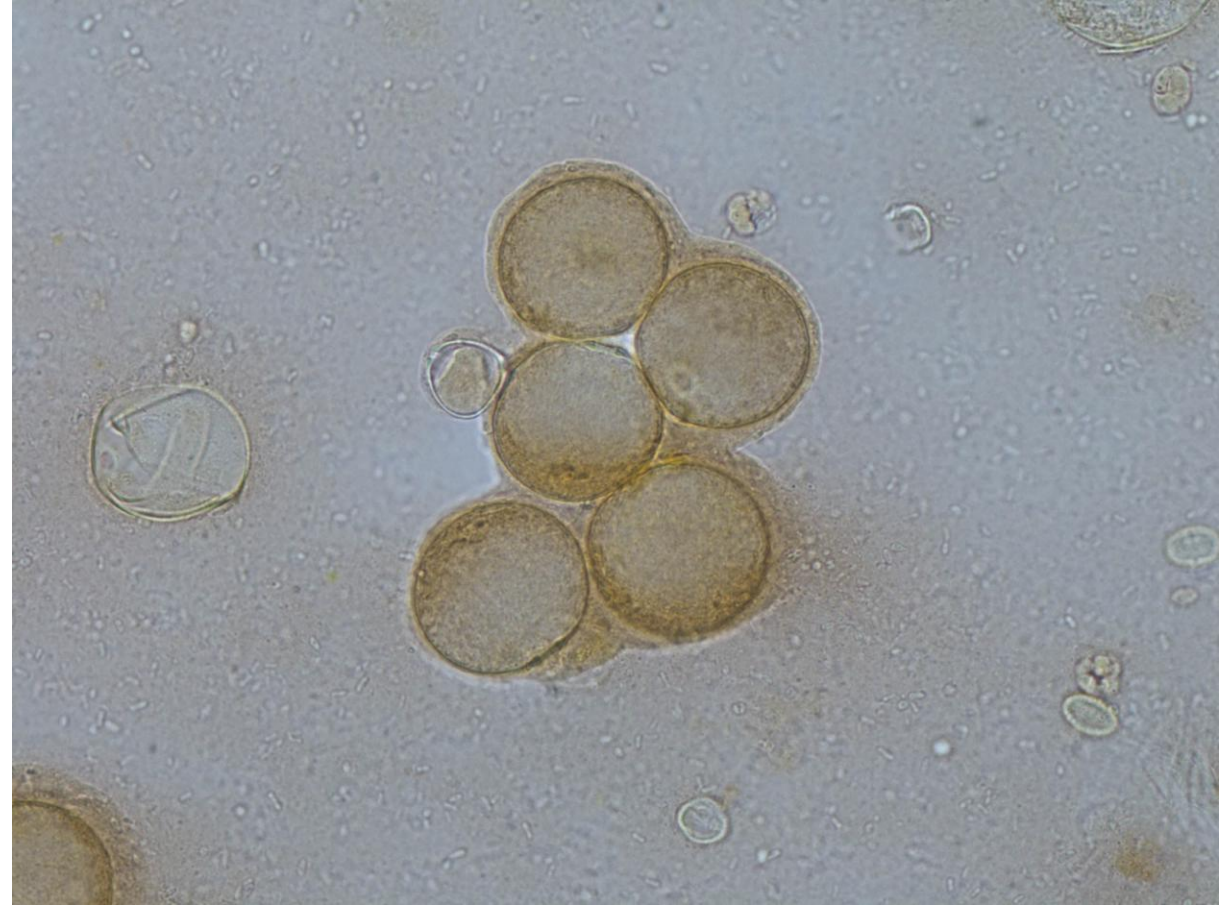


## II. Polyflora

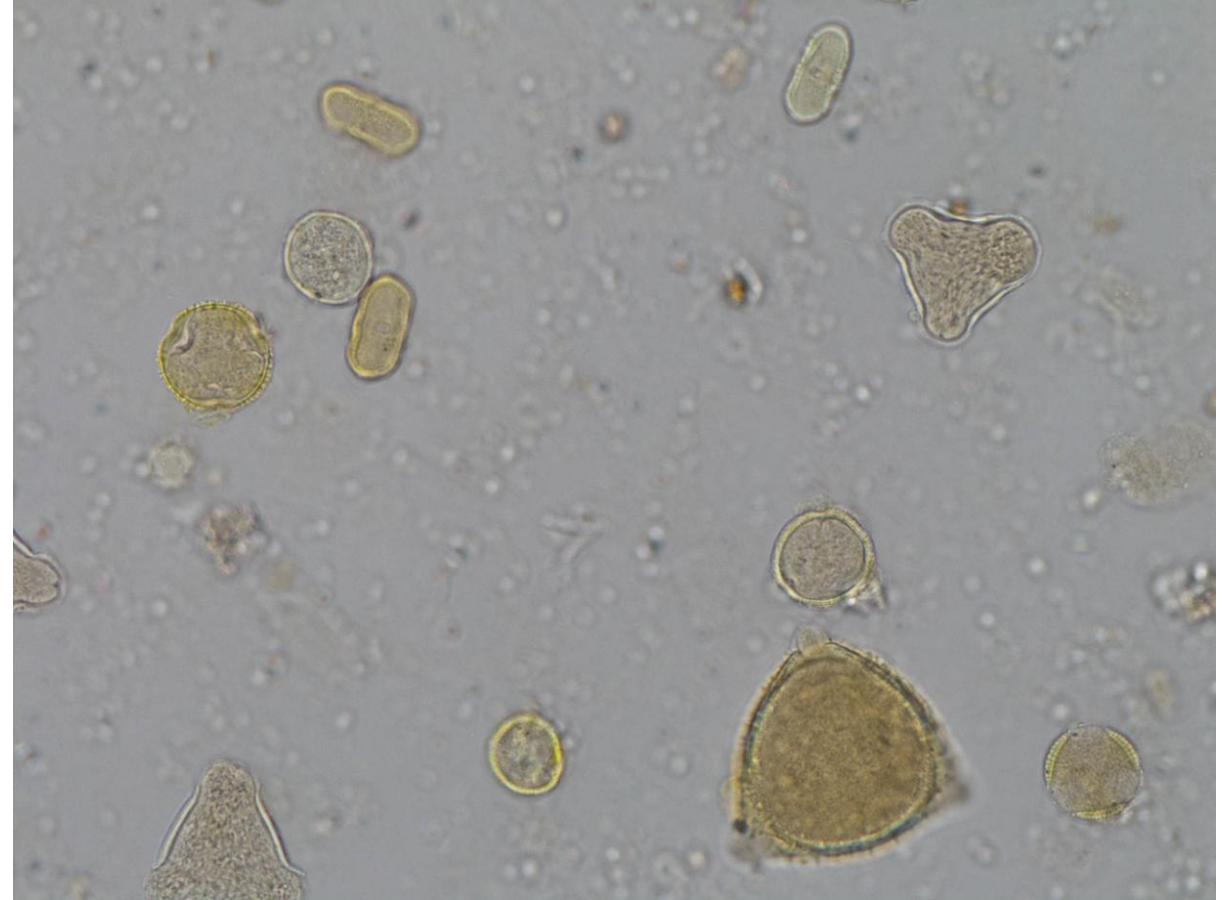
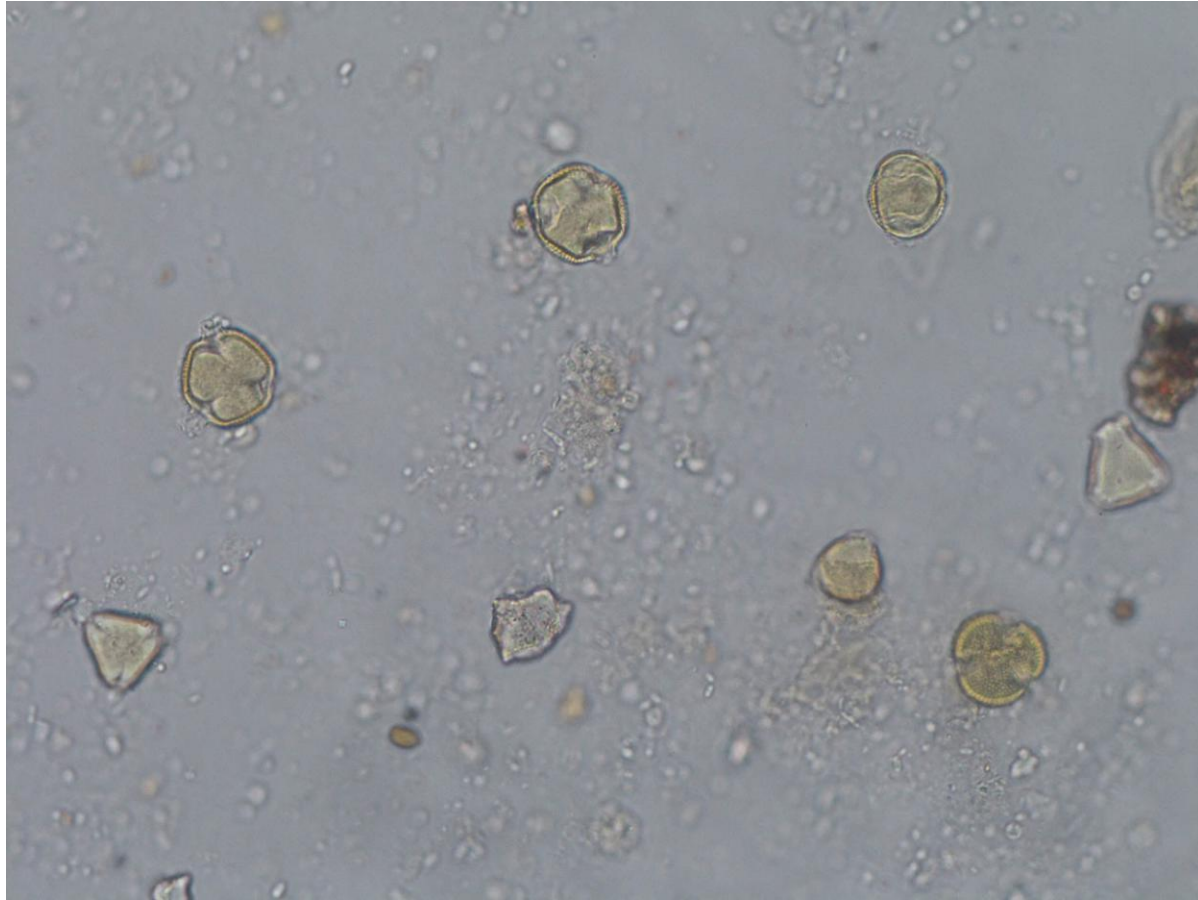




## II. Polyflora



## II. Polyflora



# Thank you for your attention!

