

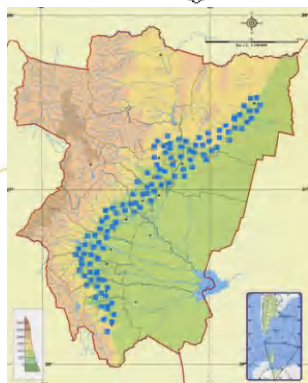


EVALUATION OF PHYSICO-CHEMICAL PARAMETERS AND MARKERS OF FLORAL ORIGIN IN LEMON BLOSSOM HONEY OF TUCUMAN, ARGENTINE

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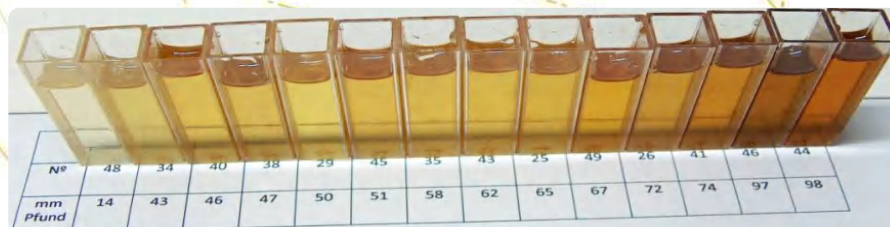
Tucuman & lemon production

- The province of Tucumán is located at north of Argentina. Its climate is subtropical with dry winters and autumn and wet spring and summer.
- Is the world leading producer of lemon with an estimated production of 1,200,000 tons and the 2^o exporter of processed products.
- Lemon plantations occupy about 35,000 has.
- The production of lemons begins three months before the rest of the country due to early flowering.
- The flowering lemon occurs from late August to late September.
- Lemon blossom honey is a typical product of Tucumán.

Floral origin - Monofloral honeys

A strategy for add value

- Polen analysis.
- Sensorial evaluation.
- Physical properties.
- Chemical composition.
 - Sugars (perseitol: avocado)
 - Organics acids (absicic: brezo)
 - Ester (MA: citrus)
 - Polyphenols (flavonoids)



Objectives

The aim of this work is to evaluate the physical and chemical characteristics and the content of hesperetin and hesperidin or the others compounds as chemical markers of blossom lemon honey produced in the piedmont of Tucumán (Argentina).



Materials and Methods

Samples



- 98 samples of lemon blossom honey were analyzed.
- Samples were obtained from commercial apiaries.
- Beekeepers involved in export processes of this type of honey to Japan in the framework of **cluster apícola NOA-Centro**.



Materials and Methods

Physico chemical methods

- Moisture: refractometry (Abbé refractometer)
- Color: Hanna colorimeter
- pH: Potentiometry
- Free acidity: Acid base volumetry
- Electrical conductivity (EC): digital conductimeter
- Glucose, Fructose: enzymatic method (commercial kit)
- HMF: White - HPLC

Materials and Methods

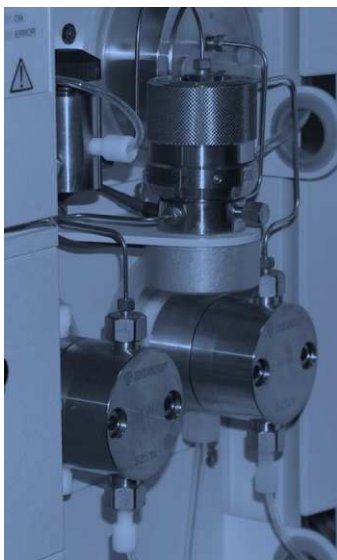
Chemical markers by HPLC

Extraction

- Honey was diluted with acid HPLC grade water.
- Dilution was passed through a SEP-Pak cartridge (C18) previously activated with methanol and acidic water.
- Polyphenolic and other compounds were eluted using methanol.

Chromatographic conditions

- Column ODS – 250 x5 mm -5 μ m
- Mobile phase: HAc/H₂O – Metanol (gradient)
- Flow: 1ml/min
- UV detection@290nm.
- Time analysis: 72 min



Results and Discussion

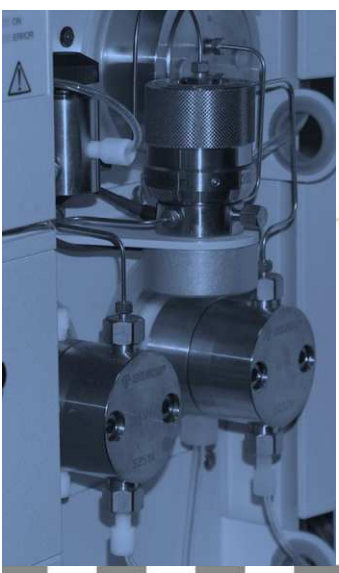
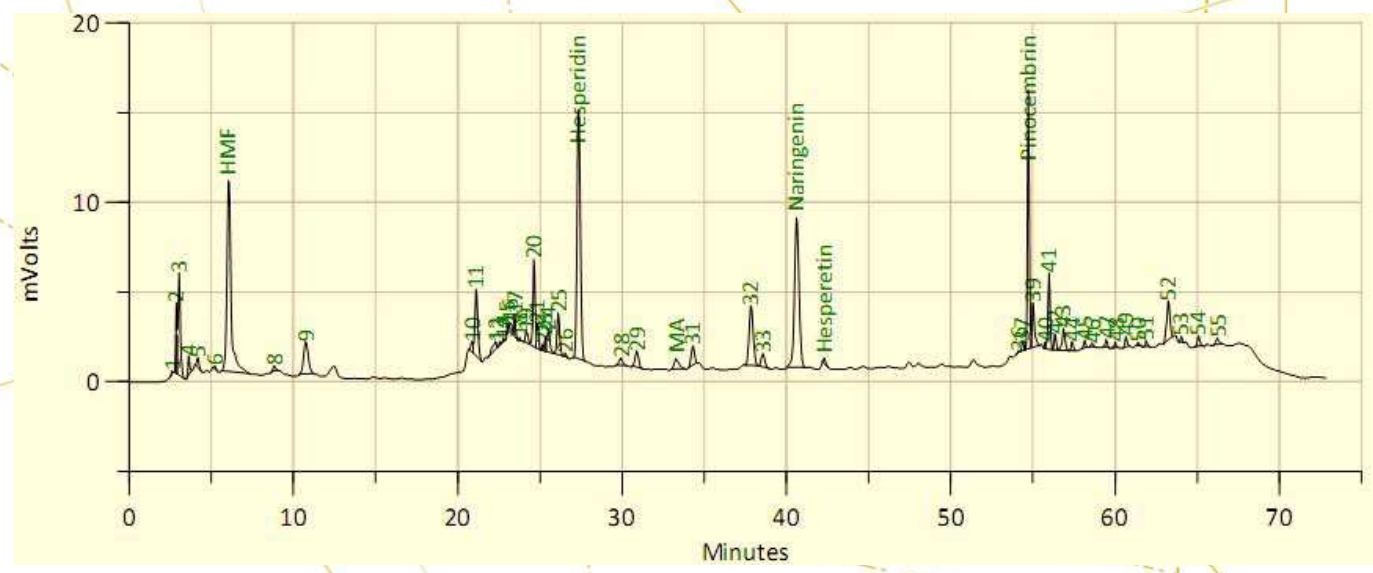
Physico chemical parameters (triplicate analysis)



Parameter	Mean \pm SD	Min	Max
Moisture (%)	16.7 \pm 0.7	15.4	18.3
Color (mmPFund)	16 \pm 5	9	23
pH	3.3 \pm 0.3	3.1	4.1
Free acidity (meq/kg)	33.9 \pm 6.4	23.7	39.3
EC (mS/cm)	0.20 \pm 0.04	0.18	0.30
Glucose (%)	29.2 \pm 2.7	25.0	36.5
Fructose (%)	35.8 \pm 4.8	24.0	41.5
HMF (mg/kg)	1.6 \pm 0.9	0.1	3.0
Ratio Glu/Moist.	1.8 \pm 0.2	1.5	2.1

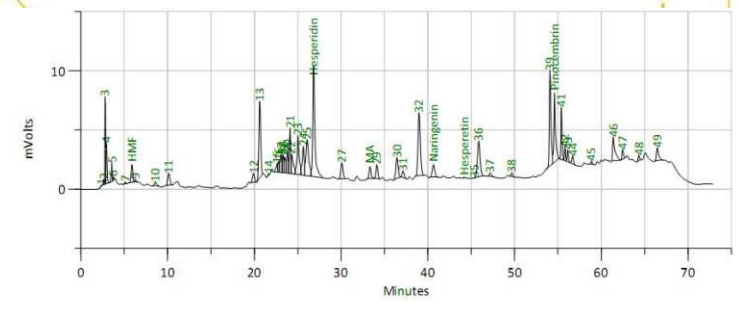
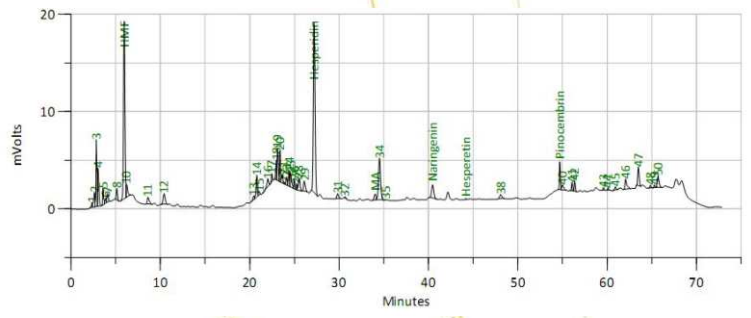
Results and Discussion

Chemical markers – HPLC profile



Results and Discussion

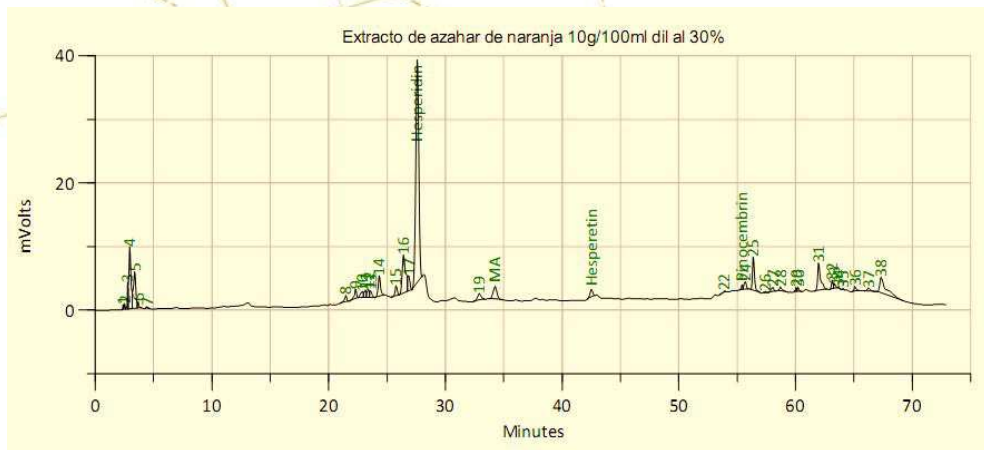
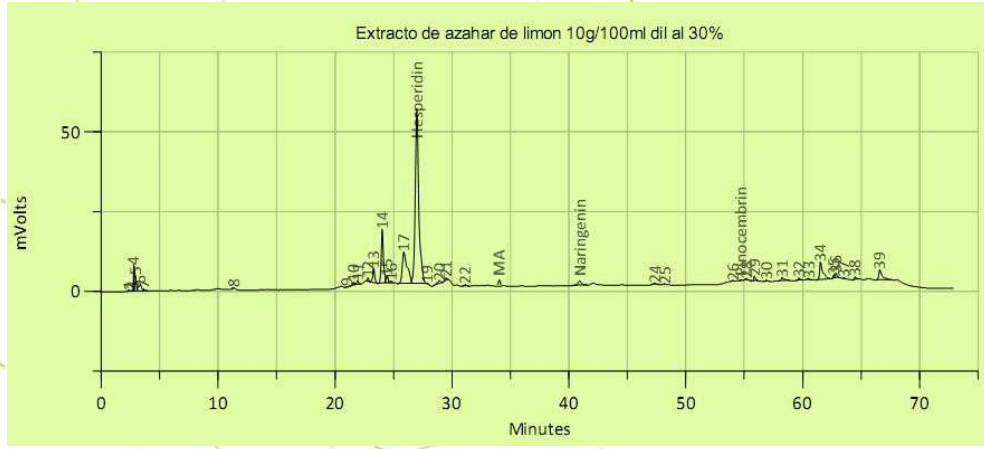
Chemical markers by HPLC (triplicate analysis)



Compound (mg/kg)	Mean ± SD	Min	Max
Hesperidin	3.0 ± 1.4	0.5	6.0
Hesperetin	0.2 ± 0.1	0.1	0.6
Methyl anthranilate	1.4 ± 0.6	0.3	2.0
Naringenin	0.5 ± 0.2	0.1	1.1
Pinocembrin	0.3 ± 0.2	0.0	0.7
Quercetin	nd		
Naringin	nd		

Results and Discussion

Chemical markers by HPLC – lemon & orange nectar



Conclusions



- Colour: extra white
- High acidity (low pH)
- Low electrical conductivity
- Slow crystallization
- Content of hesperidin greather than hesperetin
- Hesperetin was no detected in nectar of lemmon blossom and their presence may be due to hydrolysis of hesperidin by bees or extraction method for analysis.
- Methylanthranilate was detected in small amount in nectar and honey.
- Lemon blossom honey is not the same of Citrus honey

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This work was support by:
Programa Nacional Apícola (PROAPI) – INTA
Área Estratégica de Tecnología de Alimentos – INTA
Universidad Nacional de Tucumán
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THANK YOU

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