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Bee pollen is a highly nutritious natural food packed with essential nutrients required for honey bees and supports human health. The nutritional content of bee pollen varies considerably with floral species and geographic origins. This study aimed to provide the nutritional composition of Indian bee pollen from five major pollen sources; *Cocos nucifera* (coconut), *Helianthus annuus* (sunflower), *Brassica campestris* (mustard), *Sesamum indicum* (sesame) and *Zea mays* (Maize). Macronutrients, such as sugars, proteins, and lipids were analyzed, which revealed that the highest sugar content (35.25g/100g) and lipids (5.9 g/100g) in sunflower, whereas Sesame has the highest protein content (38.1 g/100 g). The highest mineral content is found in coconut followed by sunflower and the lower mineral content is found in mustard and maize. Out of the 12 amino acids analysed high contents of histidine, lysine, methionine, valine, glutamic acid, and tyrosine are found in coconut pollen; proline, aspartic acid, arginine in sunflower and threonine, valine, phenyl alanine alanine in maize.

Based on the nutritional requirements of humans, the formulation of mixed pollen of all five species was done in different ratios. Bee pollen of coconut 40%, sunflower 20%, mustard 20%, sesame and maize 10% each was mixed to meet the balanced nutritional diet. The analytical report of formulated multi-floral bee pollen is as follows:

Total sugars: 21.7; Protein: 32.5 Lipids: 5.7 g/100g

Minerals: Potassium 524; Magnesium, 276; Calcium 32; Iron 10.32; Copper 1.4, Manganese 4.8, Zinc: 3.2, mg /100g

Amino acids: Threonine 273, Valine 187, Histidine 635, Proline 2990, Methionine 92.9, Lysine 400, Phenyl alanine 105, Glutamic acid 236, Aspartic acid 879, Arginine 389, Alanine 515, Tyrosine 289 mg/100g.

The nutritional values of the formulated multi-floral bee pollen were correlated with the daily nutritional diet requirement for school-aged children. Most of the essential macro and micro nutrients of the formulated bee pollen meet the daily requirement. Therefore it is recommended as a dietary supplement (after allergy testing) to overcome nutritional deficiency in undernourished/malnourished children.



Nutritional Potential of Indian Bee Pollen

**A Sustainable Solution
for Childhood Dietary Gaps**

**Dr. K. Lakshmi Rao and
Tanishi Kavuri**



All about honeybee pollen



01

It is a natural, nutrient-rich product collected by honeybees
Used traditionally as food and medicine

02

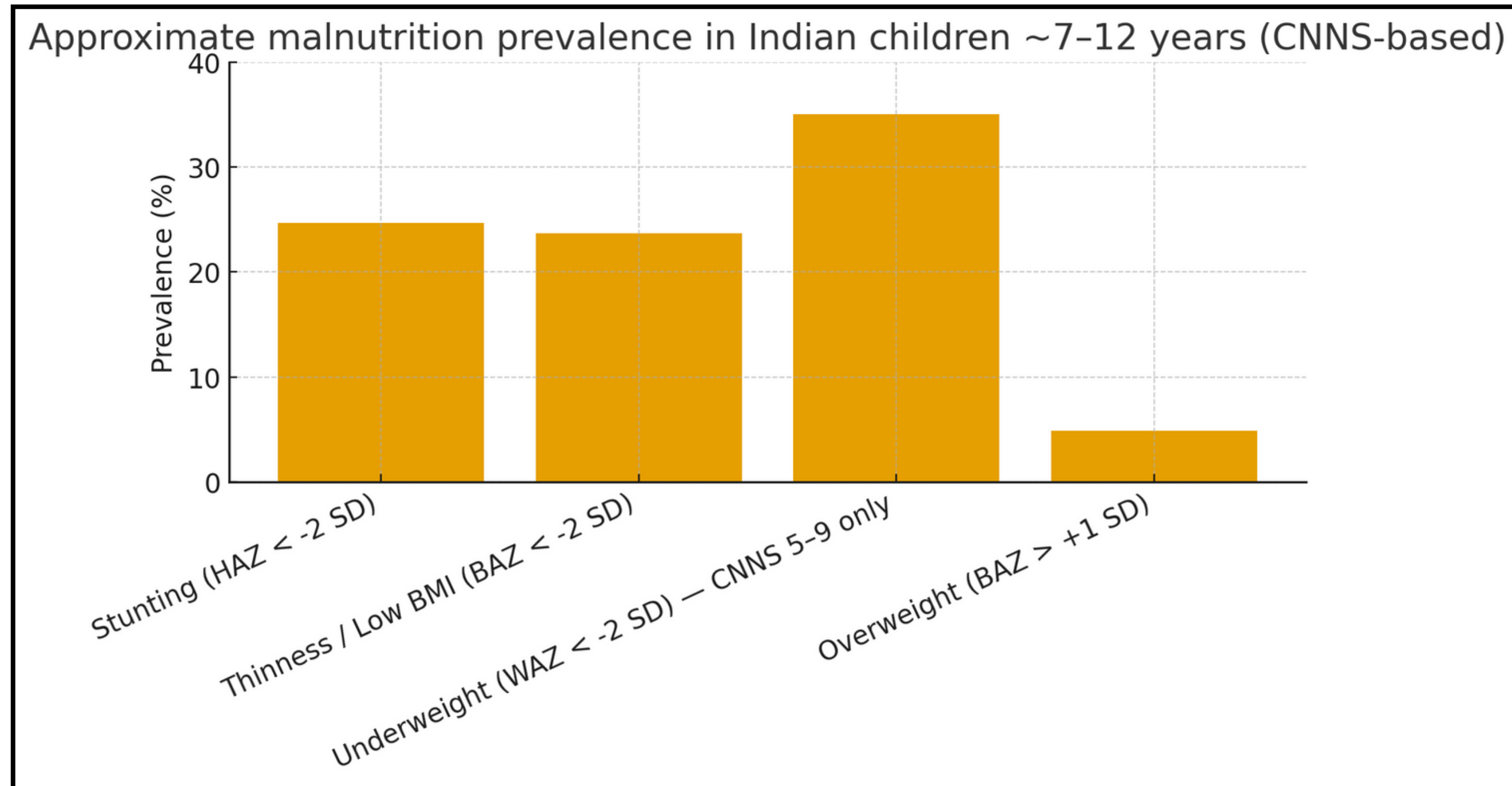
Macronutrients: sugars, proteins, lipids
Micronutrients: minerals, vitamins, amino acids

03

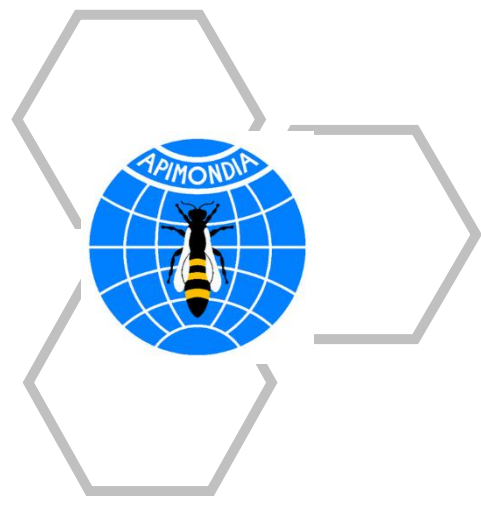
Health benefits:
supports growth, immunity, and cognitive development



Indian Childhood Malnutrition Crisis



Comprehensive National Nutrition Survey (CNNS) 2016–18 — national report
(anthropometry for 5–9 and 10–19 age groups).



Levels and trends in child malnutrition

UNICEF / WHO / World Bank Group
Joint Child Malnutrition Estimates

Key findings of the 2025 edition



STUNTING
150.2 million

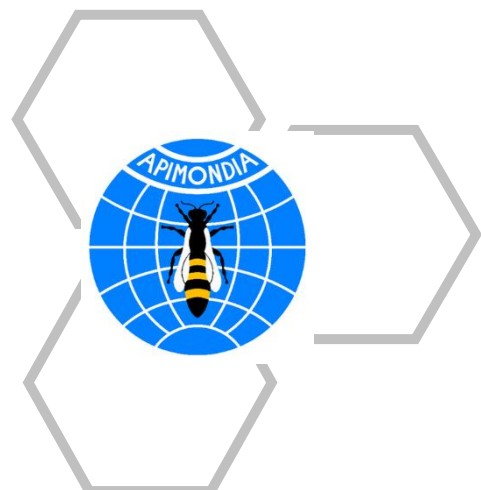
Stunting affected an estimated 23.2 per cent or 150.2 million children under 5 globally in 2024

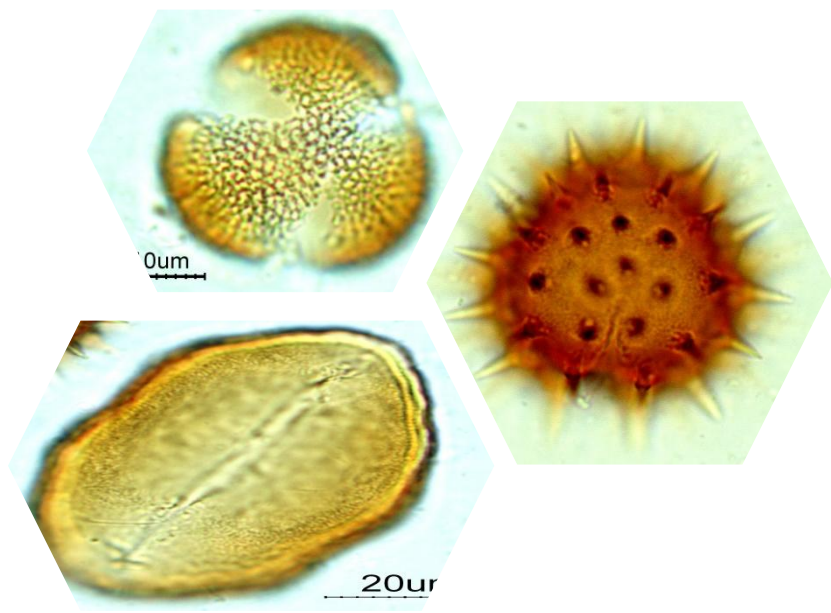
WASTING
42.8 million

In 2024, wasting threatened the lives of an estimated 6.6 per cent or 42.8 million children under 5 globally

OVERWEIGHT
35.5 million

An estimated 5.5 per cent or 35.5 million children under 5 around the world were living with overweight in 2024





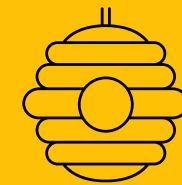
Research Aim



**To analyze
nutritional
composition of
Indian bee pollen**



**To formulate a
balanced
multifloral bee
pollen mix**



**To bridge the
nutritive gap
between malnutrition
in school going
children**



Methodology

Eco-Friendly Quality

Sample Collection

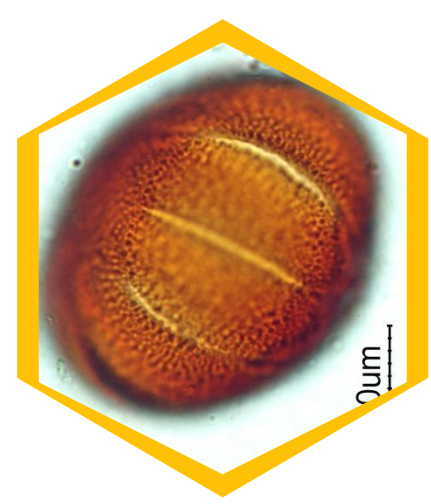
Forager bees are trapped using entrance pollen trap during the floral peak

Different botanical sources exhibited different Colour flavor and taste

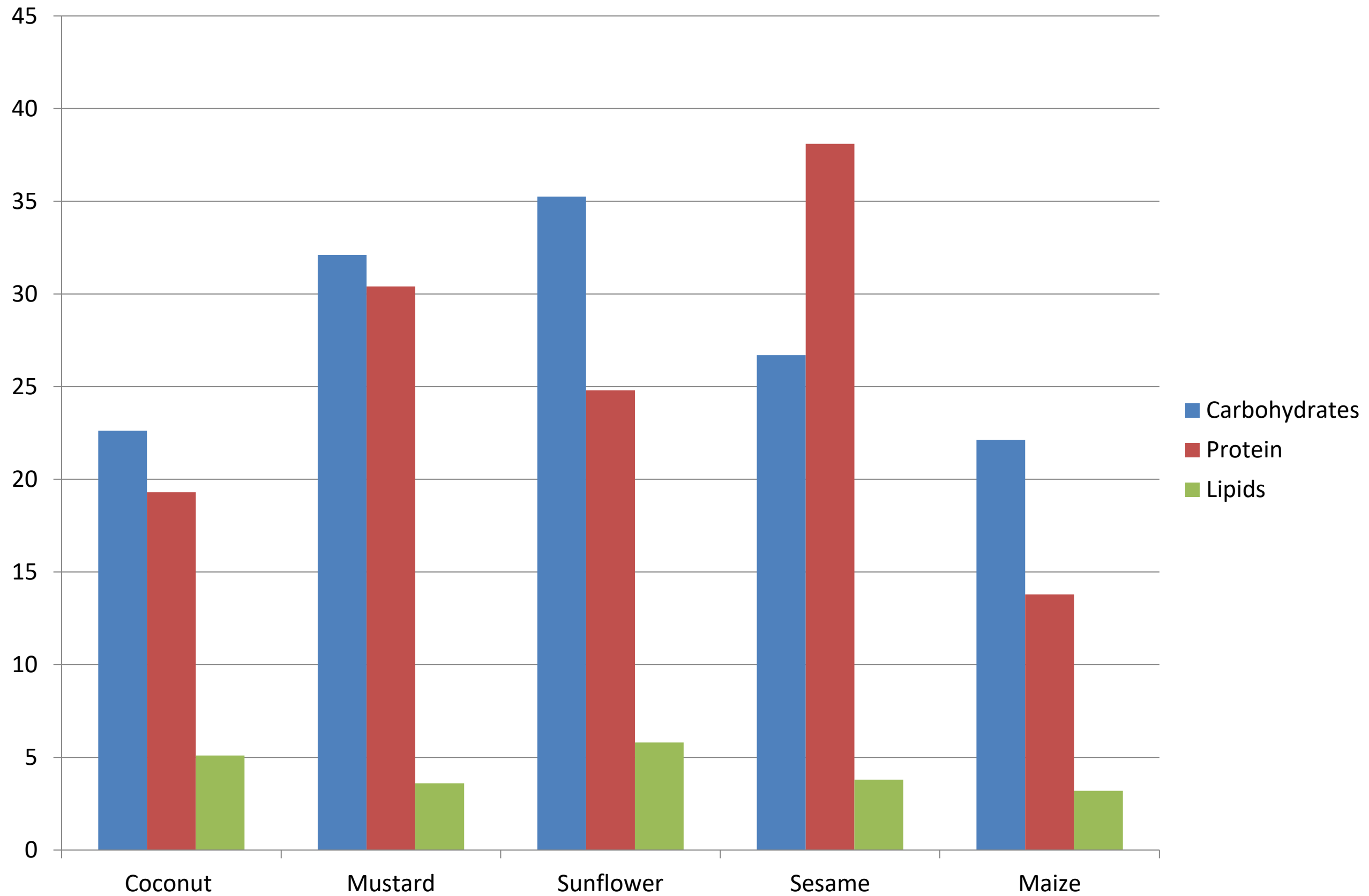
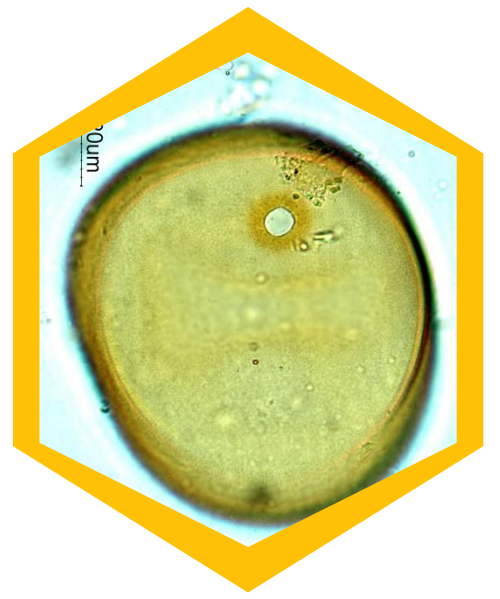
Nutritional analysis

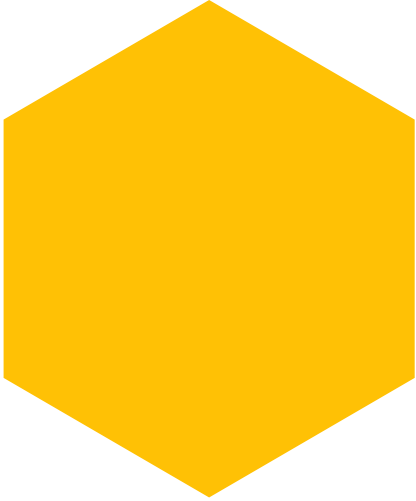
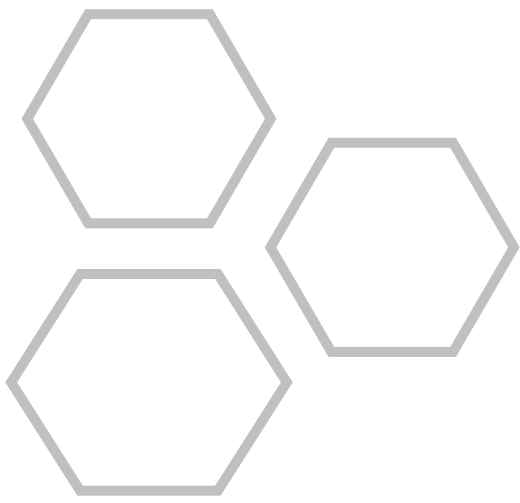
Sugars by HPLC , Protein with Kjeldahl method, Fats by Soxhlet method mass spectrometry LC-MS/MS used for Amino acid profile, Atomic absorption Spectroscopy for minerals



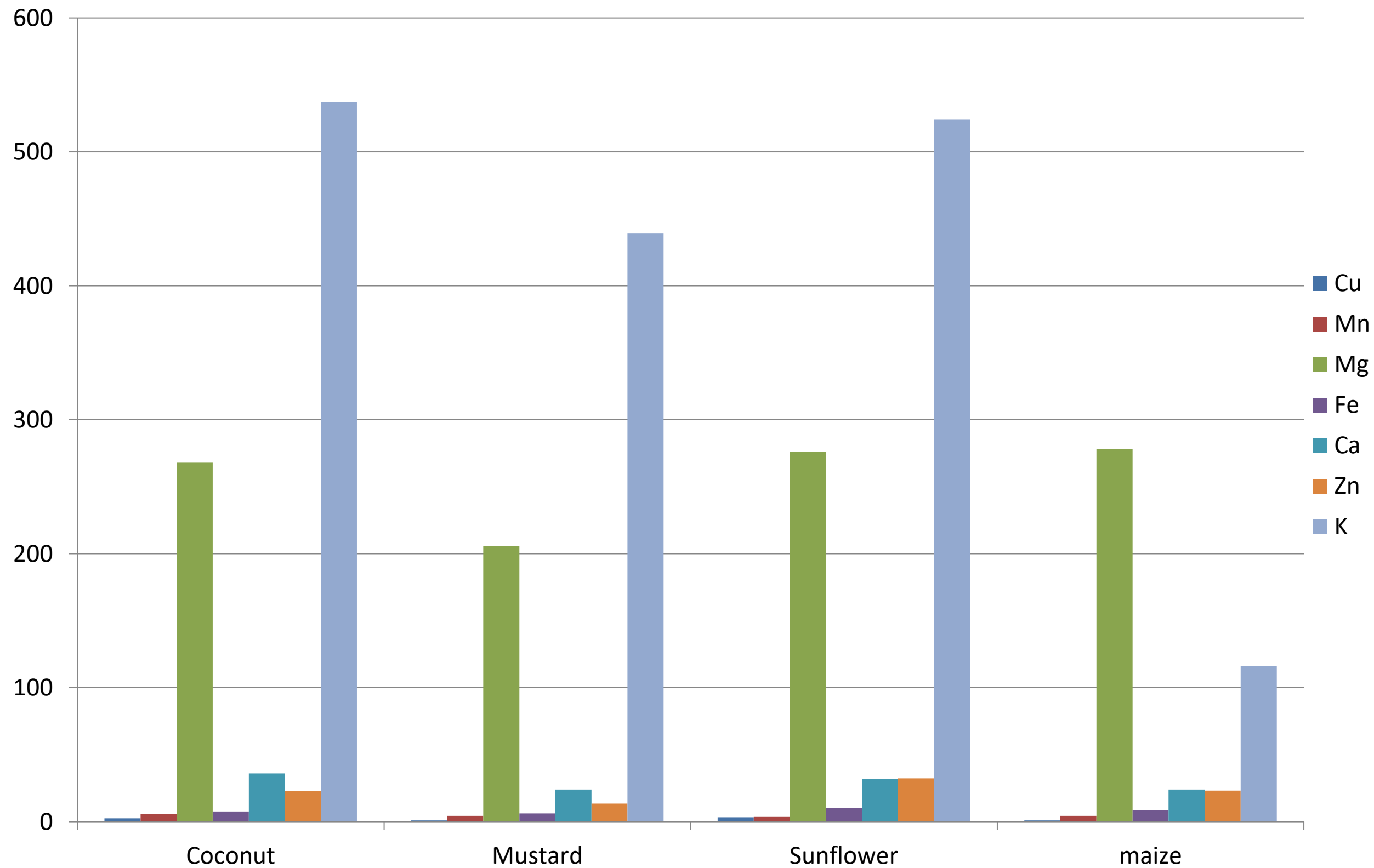


Macro Nutrients in Bee Pollen

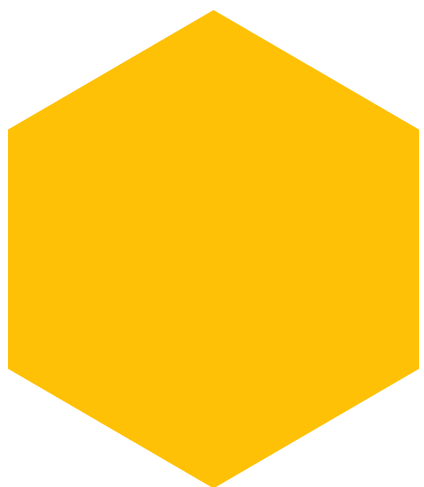
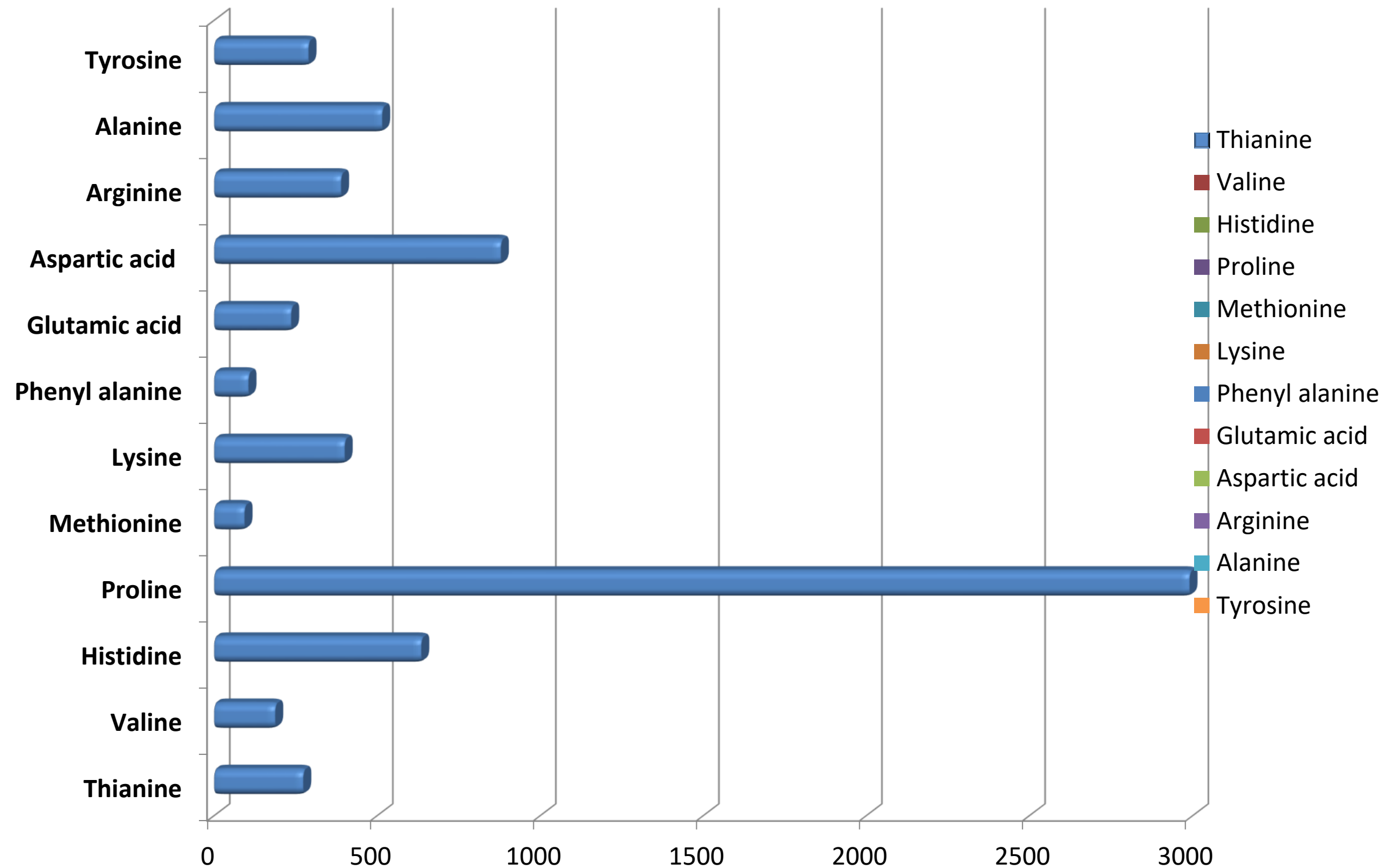
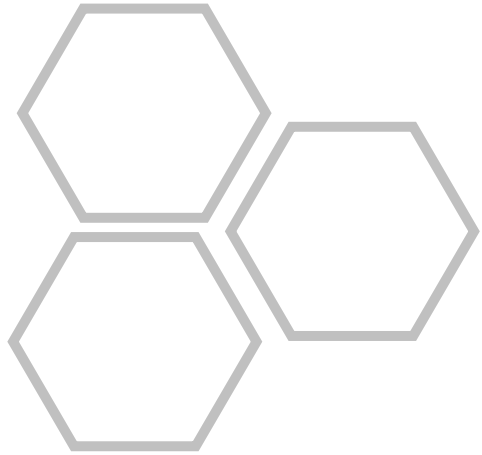




Micro Nutrients in Bee Pollen



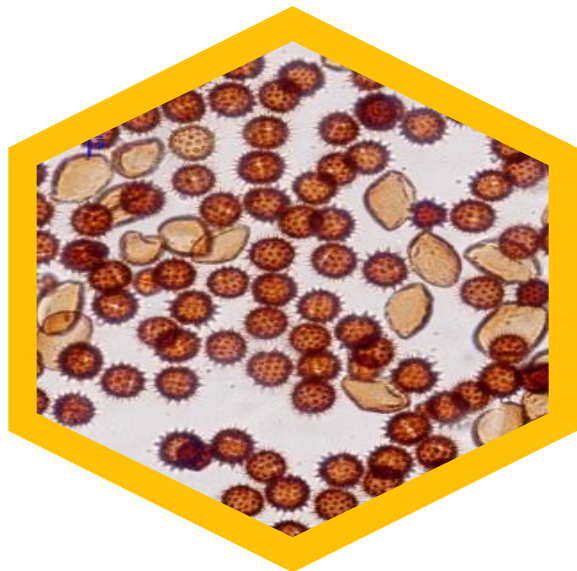
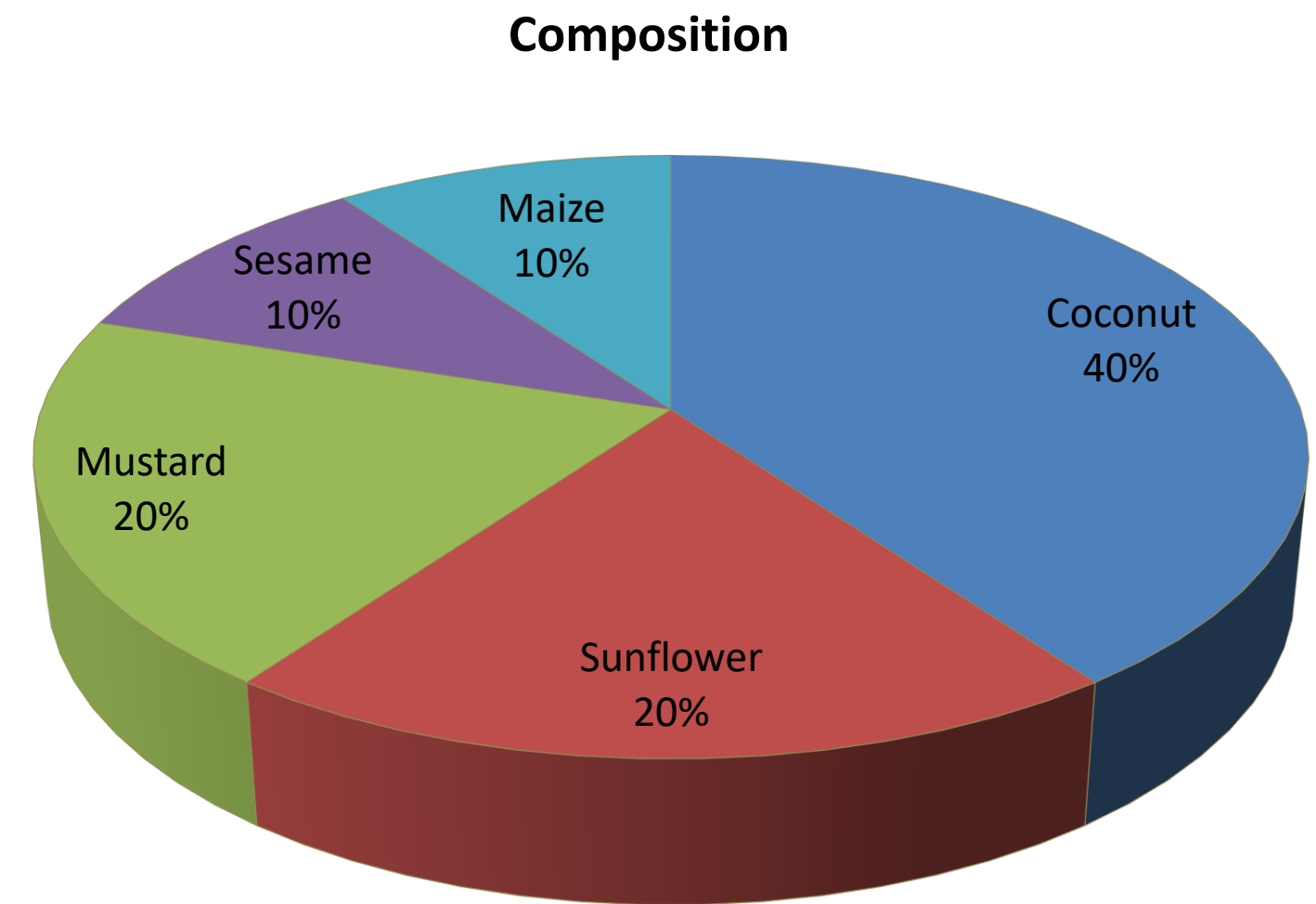
Amino Acids in Bee Pollen



Formulated Multifloral Pollen Mix



- **Composition:** Coconut 40%, Sunflower 20%, Mustard 20%, Sesame 10%, Maize 10%
- **Nutritional Profile of Mix:**
- **Total sugars: 21.7 g/100 g**
- **Protein: 32.5 g/100 g**
- **Lipids: 5.7 g/100 g**
- **Micronutrients: Potassium, Magnesium, Iron, Zinc, Calcium, copper, manganese etc.**
- **Essential amino acids balanced**



Correlation with Children's Daily Needs

Nutrient	Bee Pollen (per 100 g)	ICMR RDA 7–9 y	ICMR RDA 10– 12 y (boys/girls)
Protein (g)	32.5	23.3	31.8 / 32.8
Carbohydrates (g)	21.7 (sugars)	≥50–60% energy (~≥200 g)	≥50–60% energy (~≥200 g)
Lipids (g)	5.7	~20–30% energy (≈45–70 g)	~20–30% energy (≈45–70 g)
Calcium (mg)	32	650	850 / 850
Magnesium (mg)	276	175	240 / 250
Iron (mg)	10.32	15	16 / 28
Potassium (mg)	524	3510	3510
Zinc (mg)	3.2	5.9	8.5 / 8.5
Copper (mg)	1.4	2	2 / 2
Manganese (mg)	4.8	4	4 / 4

Table: Nutrient content of multifloral bee pollen vs. ICMR RDA for children 7–9 y and 10–12 y (boys/girls) nin.res.in/metabolichealthdigest.com. Percentages described in bullets. The pollen's high protein and mineral levels help meet these RDAs.



Conclusion

Indian Bee pollen is loaded with natural bioactive molecules
Composition of nutritional compounds and micro nutrients are varied for different botanical origins.

Formulated composition

During childhood micronutrient insufficiency may effect the mental and physical developmental disabilities like ocular disorders, hearing disability autism, and general loss of energy and potential .

Maintaining a micronutrient rich diet may provide enough protection against all of above pathologies.

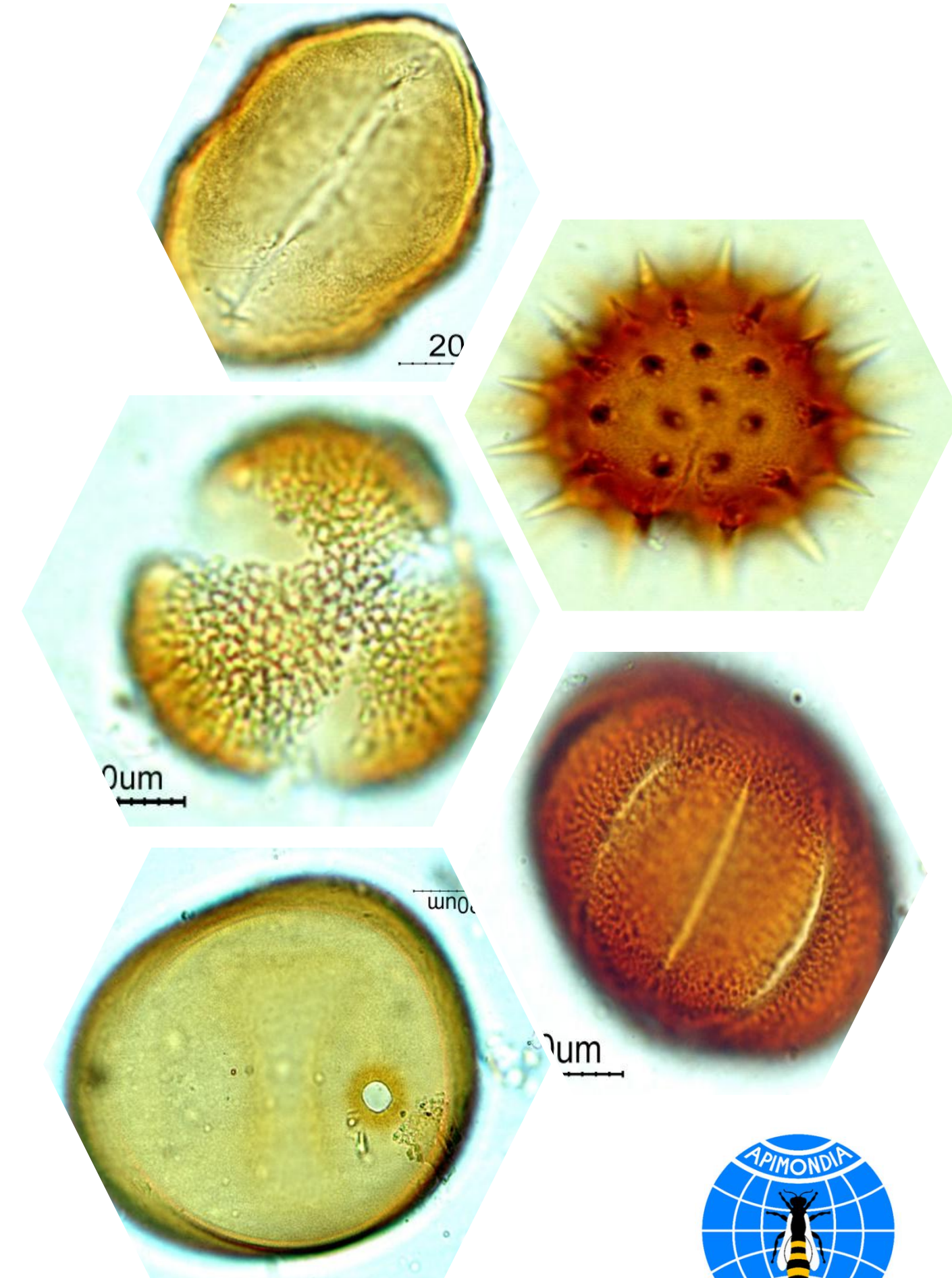
The protection can be guaranteed by consuming a large variety of well balanced and rich natural products such as composite bee pollen

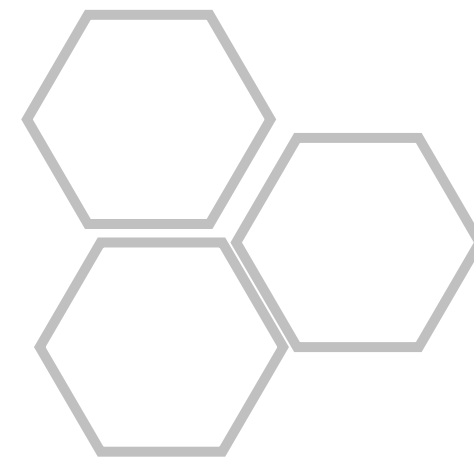


Adding multifloral bee pollen in the daily diet of school going children will overcome nutritional deficiency in undernourished/ malnourished children.



Adding bee pollen in mid-day meal of school children not only protecting from disabilities also enhances their mental and physical development .





Thank You

Feel free to ask Questions !

