BIOMIMETRIC DRONE TO CONTROL BIRD PESTS AND OPTIMIZE CITRICULTURE.

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What is a drone?

It is defined as an unmanned aerial vehicle, UAV which, is controlled by means of remote or autonomous control, which to raise using the rotational force of its engines attached to the propellers, commonly known as drone.[1]

Tricopter

(3 engines)

Cuadricopter

(4 engines)

Hexacopter

(6 engines)

Octacopter

(8 engines)

Main application areas :

Search and rescue: they are used in fire fighting, to determine the amount of gases in the air (CO_2) using special measuring equipment.

Surveillance: allows recording and monitoring from the sky and, therefore, is suitable for monitoring.

Science and research: used to document, glacier surveillance, to observe a volcanic eruption, etc.

Aerial photography and video: With a drone equipped with an HD camera, you can take fascinating photos and high quality shots from the sky.

Surveying and mapping: by using multispectral cameras and laser scanners, drones can create high-quality three-dimensional maps. [2]

Unmanned cargo system: to deliver packages. In this way, you can have a safe, ecological and fast air freight transport. [3]

Main uses:

Crop monitoring

Herbicide and fertilizer application.

Livestock management and health problem monitoring.

Counting of specimens in crops.

Pests detection

AGRICULTURE

Main
Pests:

Insects:

- Locust

- Red beetle

Birds:

-Celestial Bird

-Pigeons

Diseases, viruses and weeds:

-Rust

-Nematodes

Citriculture
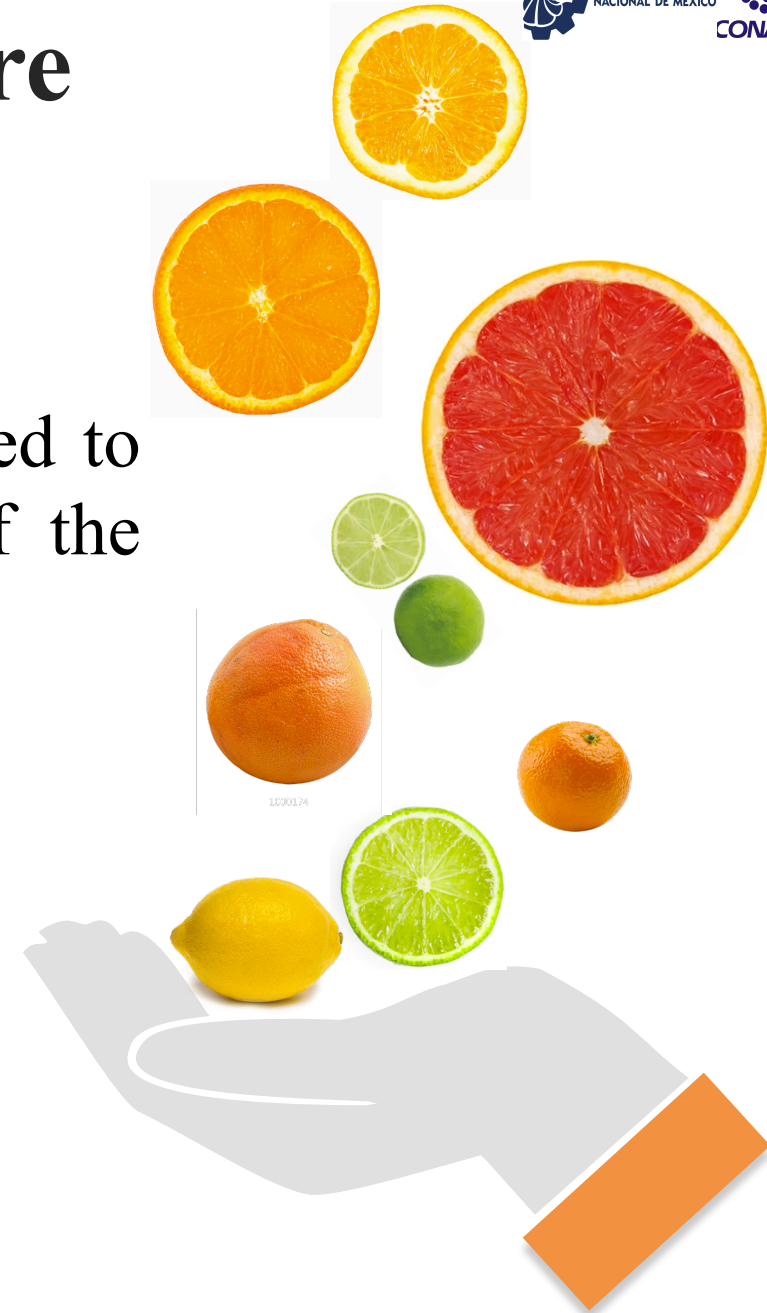
What is?

It is the set of agronomic techniques oriented to the production of plant species, mainly of the citrus genus.

- Orange - Citrus sinensis
- Tangerine - Citrus reticulata
- Lemon - Citrus Lemon
- Lima - Citrus aurantifolia
- Grapefruit - Citrus paradisi

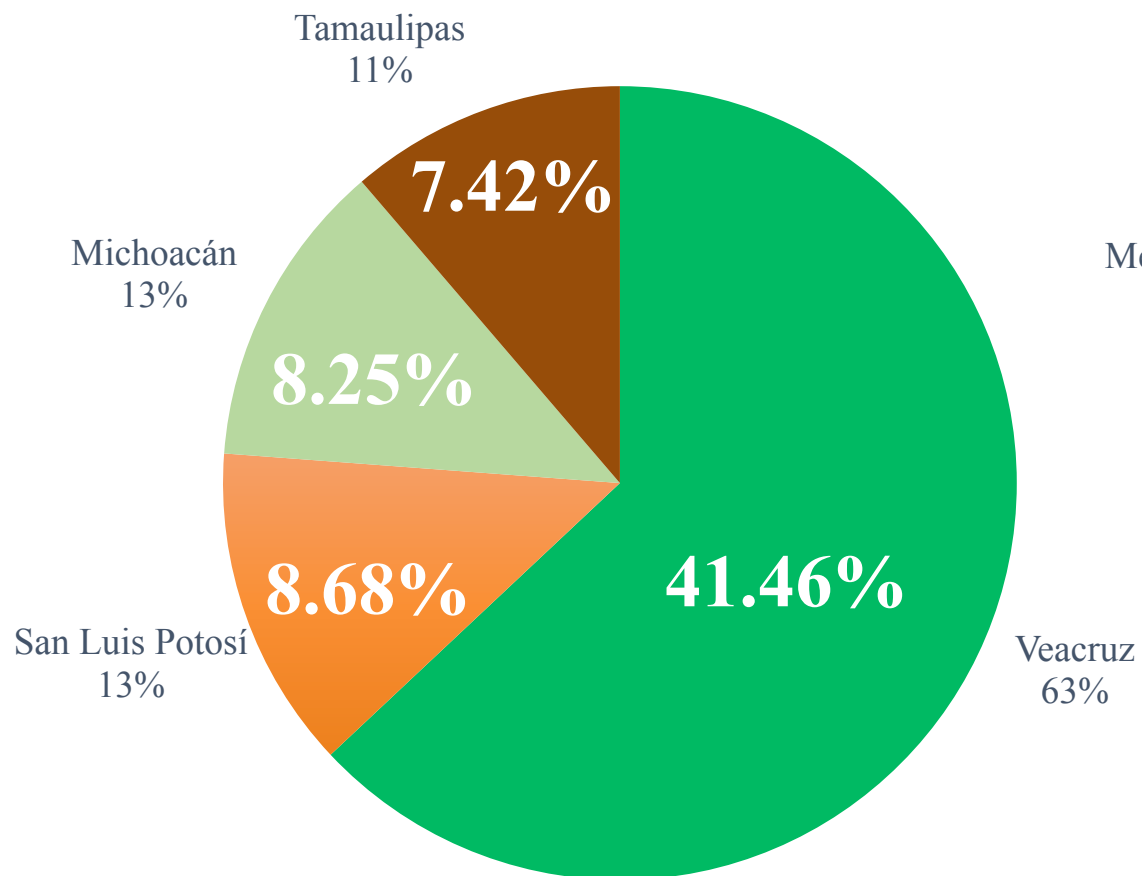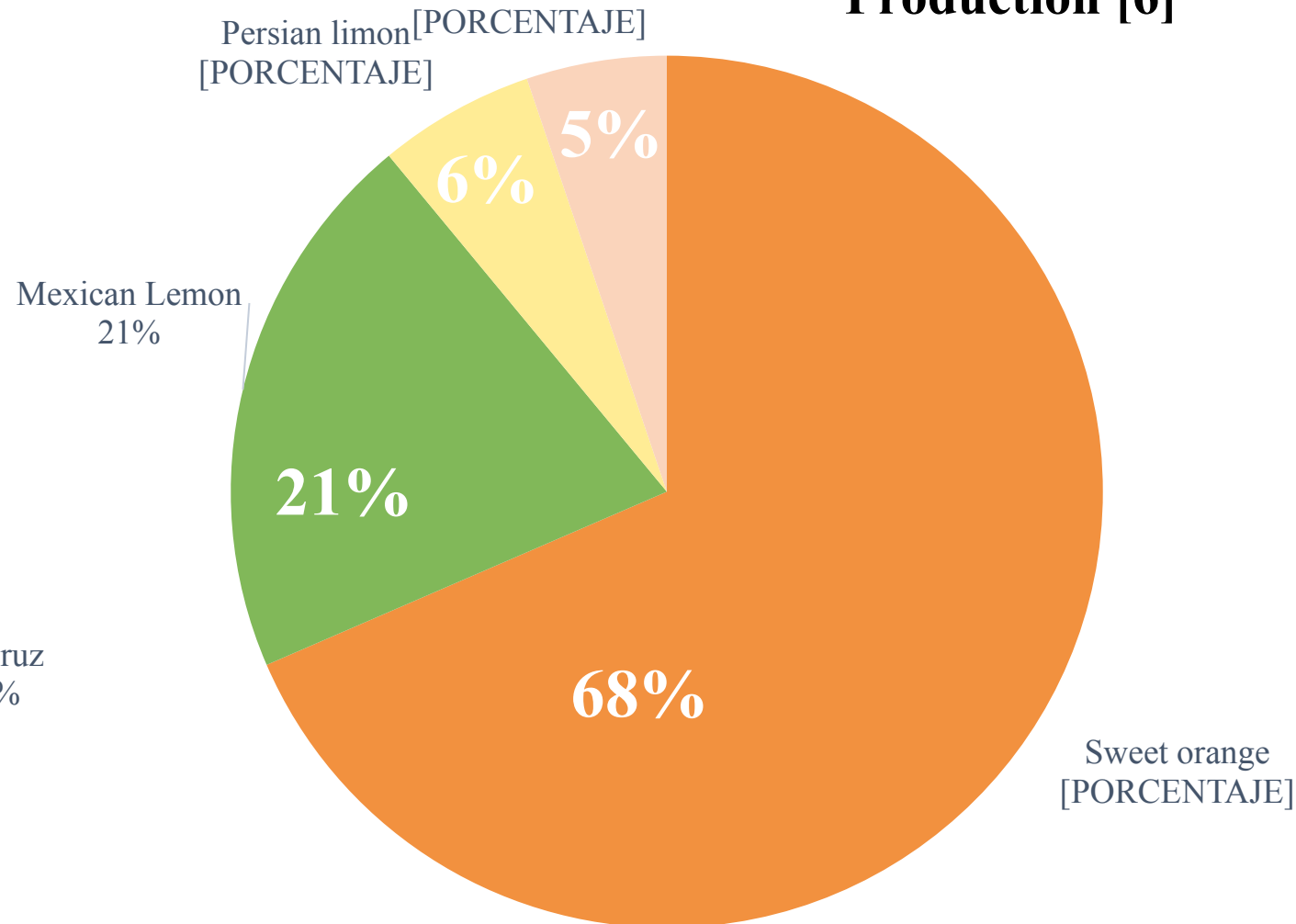# Established Surface[5]

- Tamaulipas 11%
- Michoacán 13%
- San Luis Potosí 13%
- Veacruz 63%

7.42%
8.25%
8.68%
41.46%

Legend: Veacruz | San Luis Potosí | Michoacán | Tamaulipas

Production [6]

- Grapefruits, tangerines and tangerines [PORCENTAJE]
- Persian limon [PORCENTAJE]
- Mexican Lemon 21%
- Sweet orange [PORCENTAJE]

5%
6%
21%
68%

Legend: Naranja dulce | Limón mexicano | Limón persa | Toronjas, mandarinas y tangerinas

Multispectral Images

It captures image data within wavelength ranges across the electromagnetic spectrum, they can be separated by filters or by the use of sensitive instruments, including light frequencies beyond the range of visible light, such as infrared and ultraviolet. [7]
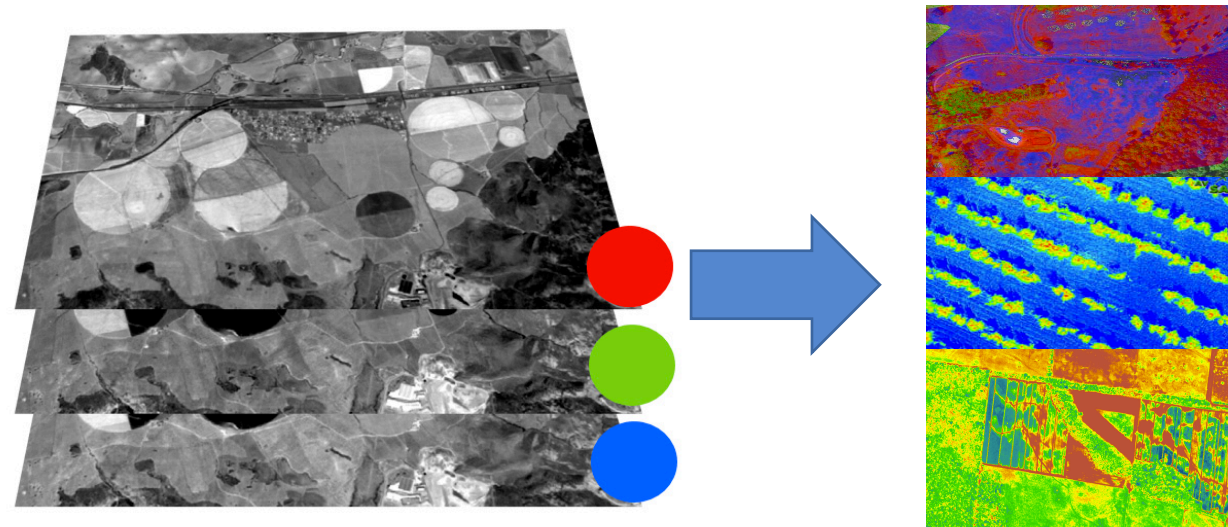
Source: "Cómo Interpretar Una Imagen Satélite a Falso Color - Gis&Beers." http://www.gisandbeers.com/interpretar-una-imagen-satelite-falso-color/ (October 26, 2019).

From the multispectral images that capture this type of sensors, different vegetation indices that indicate the health and well-being of the vegetation can be calculated. On the other hand, determine whether or not there are pests in the crops.

Water stress level suffered by a plant

Eexistence of diseases in plants

Presence of bird pests

Celestial bird

- It measures approximately 15cm.
- It has a metallic blue color on the back, being the wings and tail gray in greenish tone. The female is a more muted color. [8]
- Responsible for the greatest damage to orange crops.
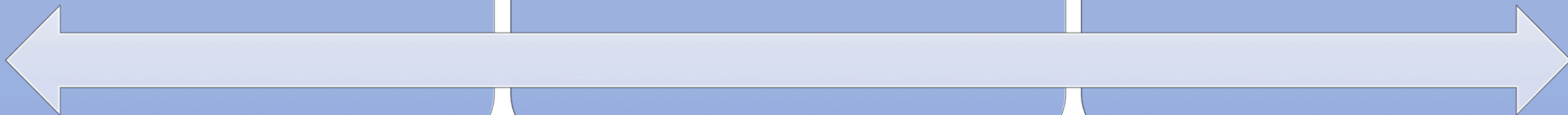
Methods to drive away

The use of light as a bird repulsion system

The repellent consists of imitating sounds of natural predatory birds of bird pests

Biomimetic drones, inspired by predatory birds

Methodology

OPERATION

- The flight is planned and the images obtained.

POSTPROCESSING

- Processing of the images obtained.

APLICATION

- The way of acting on crops is determined based on the images obtained.

Conclusions

To conclude this research, the increase in citrus productivity represents an increase in profits in the economic system, which will cause an improvement in the economy of citrus in the state of Veracruz since with the technology implemented, it will be It is possible to reduce pest attacks and, at the same time, optimize the process of monitoring farmers, reducing time and labor.

Future work

There are many areas where drone technology has not yet been implemented, so the pest recognition system should extend pest pest recognition and prevention to an agricultural security and monitoring sector indispensable for farmers not only in citrus farming, but also in other types of fruit in order to obtain a more optimal precision agriculture.

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Thank you!
Get in touch with us

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