



Title: Application of homeopathic preparations and biofungicides to prevent and control anthracnose (*Colletotrichum gloeosporioides*) in haas avocado crops

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Introduction

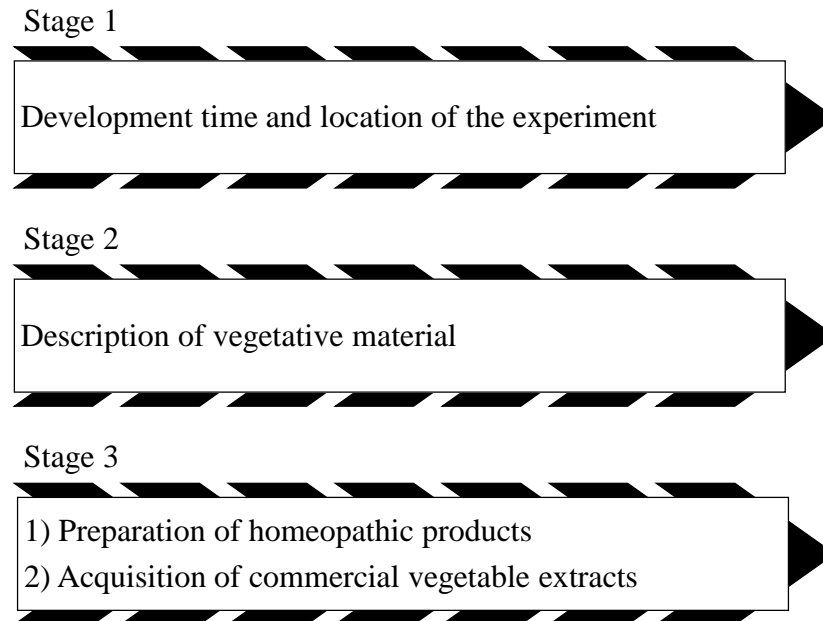
The avocado harvest (*Persea americana Mill*) is an economic factor of great importance for the country, so its consumption and marketing has grown considerably, both in the national and international markets.

The need to generate sustainable and economic means or alternatives that avoid or reduce the appearance of conditions such as anthracnose (*C. gloeosporioides* in hass avocado crops (*P- americana*), brings with it the development of the present research implemented an Agrohomeopathic process through the placement of various preparations by spraying 64 trees in a plantation consisting of 370 trees corresponding to the aforementioned fruit genus, the process was observed through the decrease in the number of pustules on leaves and fruit, decrease in the length of the pustule (cm), pustule width (cm) in both fruits and leaves.

Methodology

The methodological process is made up of 2 phases; Phase 1 is called recognition and validation of the experimentation process and is analyzed through 3 stages, in Phase 2 the homeopathic preparations were applied through a series of experiments in the planting of the fruit (application of experimental processes).

Figure 1 Stages that constitute Phase 1



Consultation Source: Own elaboration

Stage 1) Development time and location of the experiment

Figure 1 Avocado fruit plantations



Consultation Source: Own elaboration

Stage 2) Description of vegetative material

Figure 2 Vegetative material



Figure 3 Fruit with anthracnose affection



Consultation Source: Own elaboration

Stage 3) Preparation of homeopathic products

The experiment consisted of the application of agronosodes such as:

1. *Árnica montana* 6CH and 20 CH
2. *Calcarea carbónica* 6CH, 20CH
3. *Chamomilla* at 6CH and 30CH
4. *Ferrum phosphoricum* at 6CH and 30C
5. Anthracnose Agronosode (*C. gloeosporioides*) obtained from avocado fruit and leaves at 10 CH and 30 CH.

Figure 4 Homeopathic products



Figure 5 Fruit with Anthracnose for Agronosode



Phase 2) Application of experimental process

Figure 6 Application of Fungizar



Figure 7 Bioassay applied by spraying system



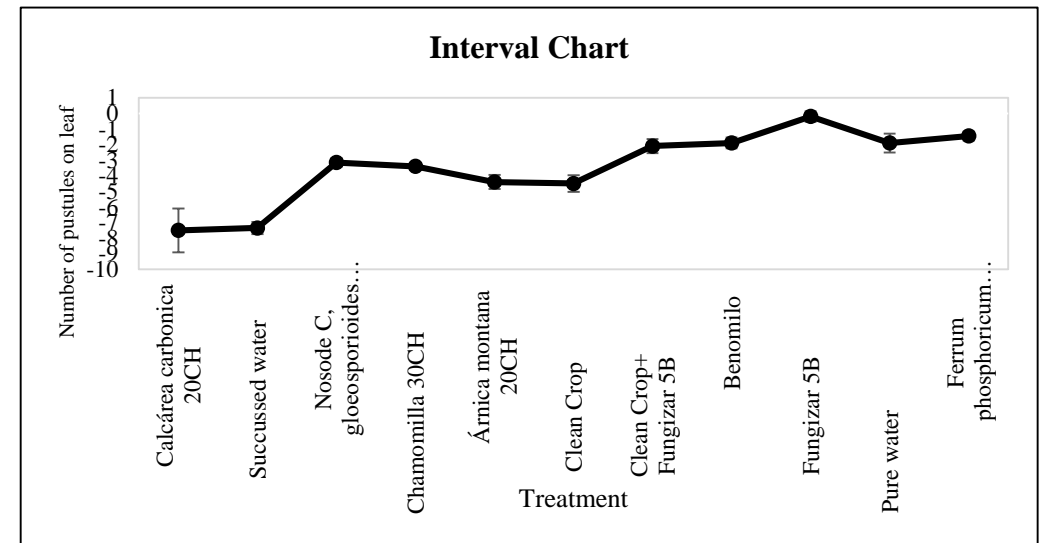
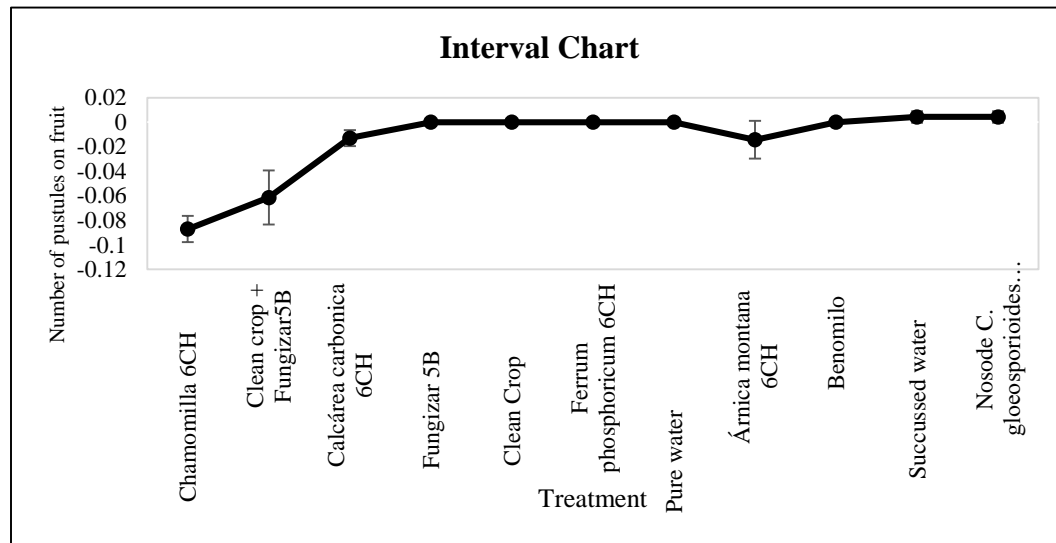
Figure 8 Application of homeopathic preparations and biofungicides



Consultation Source: Own elaboration

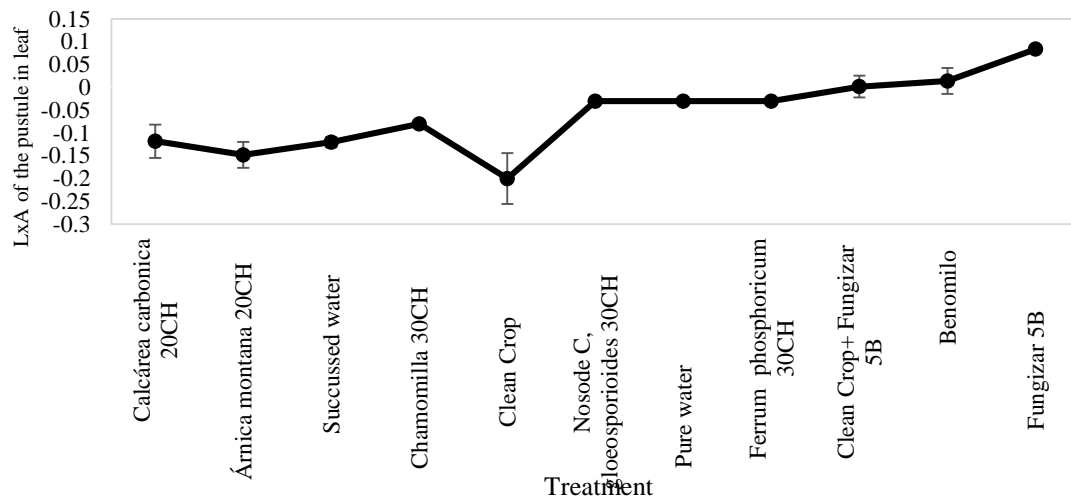
Results

The data were tested for the assumptions to find out if they met normality and homogeneity of variance, so an analysis of variance was carried out. If no significance was found between the treatments, the Tukey test was used. If the assumptions were not met, a non-parametric analysis was performed.

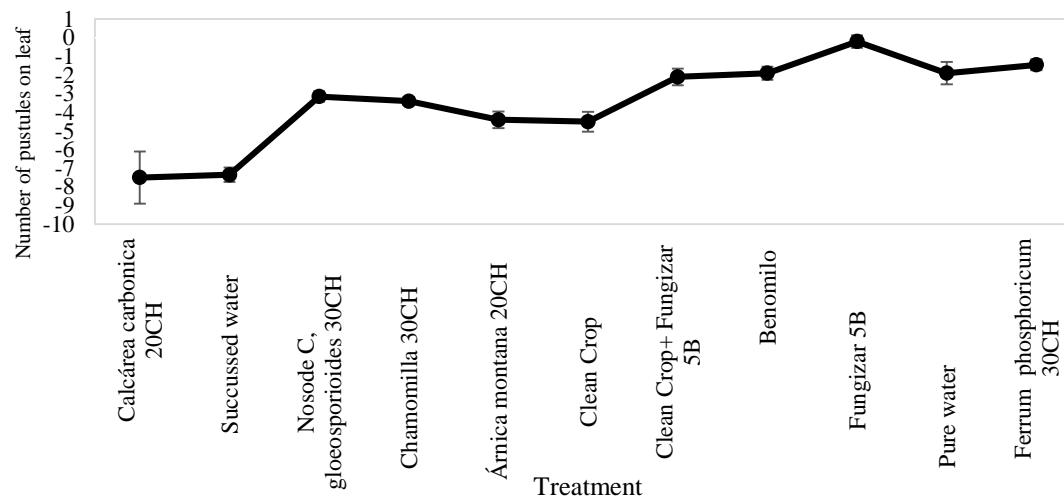


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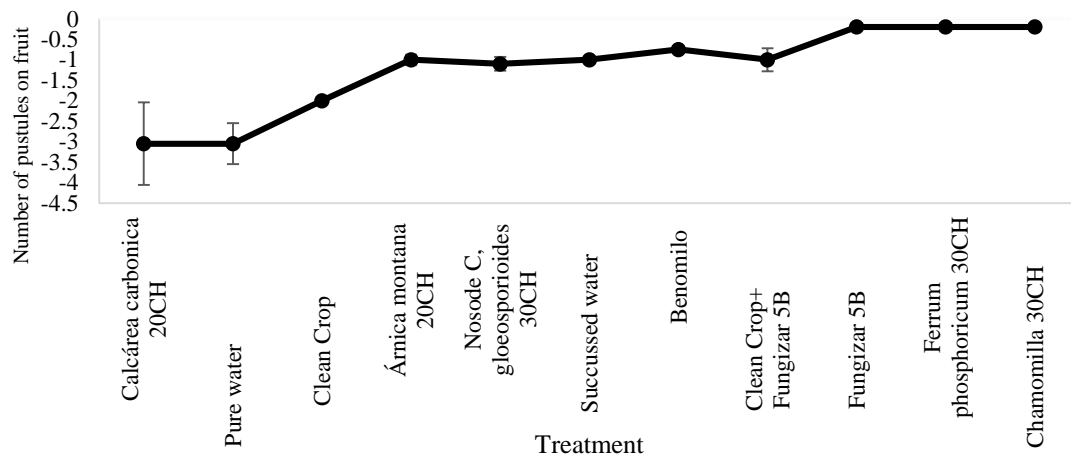
Interval Chart



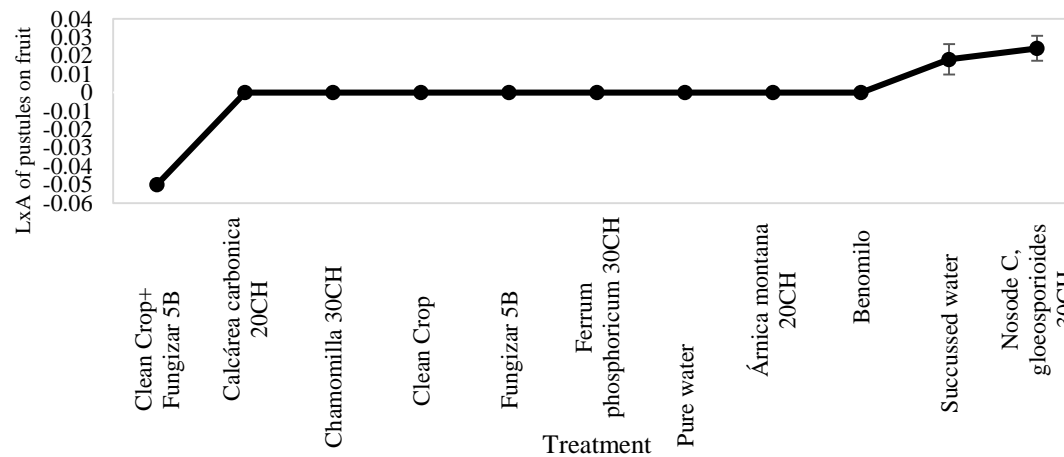
Interval Chart



Interval Chart



Interval Chart



Annexes

Table 1.1 Abstract of significant LxA tests of the pustule in fruit, testing every eight days

* Kruskal Wallis test; * Tukey's test									
L x A of pustule on fruit									
Treatment	Reduction 1			Reduction 2			Reduction 7		
	Prom	R		Prom	R		Prom	R	
Chamomilla 6CH	-0.03	17.13	a	-0.08	18.13	a	-0.1	13.2	A5
Clean crop + Fungizar5B	0.05	27.88	a	-0.05	18.5	a	-0.08	13.5	a
Calcárea carbónica 6CH	0	22.5	a	-0.03	18.88	a	-0.03	19	a
Fungizar 5B	0	22.5	a	0	24	a	0	24	a
Clean Crop	0	22.5	a	0	24	a	0	24	a
Ferrum phosphoricum 6CH	0	22.5	a	0	24	a	0	24	a
Pure water	0	22.5	a	0	24	a	0	24	a
Árnica montana 6CH	0	22.5	a	0	24	a	0	24	a
Benomilo	0	22.5	a	0	24	a	0	24	a
Succused water	0	22.5	a	0	24	a	0.03	28.8	a
Nosode C. gloeosporioides 10CH	0	22.5	a	0	24	a	0.03	28.8	a

Consultation Source: Own elaboration

Conclusions

In the evaluation of 10 homeopathic products, *Á. montana* 6CH and 20CH, *C. carbonica* 6CH, 20CH., Chamomilla at 6CH and 30CH, *F. phosphoricum* at 6CH and 30CH, and a biopreparation of Anthracnose (*C. gloeosporioides*) obtained from fruit and avocado leaves at 10 CH Y 30 CH, 2 organic products Fungizar 5B, Clean Crop and the combination of both products as well as a commercial chemical Benomilo®, suctioned water and pure water as a control. The treatments that showed effective control over the infection of *C. gloeosporioides* were the agrohopathic doses of the *C. gloeosporioides* preparation at 10 CH, in which the parameter length by width in fruit stood out at 56 days for its control applying it every eight days, as well as in the parameter of length by width in leaf at 40 days, in the same way for the applications evaluated every 15 days at 30CH at 30 days after application.

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