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|  |  |
| --- | --- |
| **EXTRANET CODE** | **3845114** |
| **COMMERCIAL NAME** | **CORMORAN** |
| **ACTIVE INGREDIENT** | **ACETAMIPRID 80 g/L + NOVALURON 100 g/L** |
| **DESCRIPTION** | **Final report, Development, Rice, Insects** |
| **SUBJECT:** | **Field trial for Development** |
| **2. PLANNED OR PLACED TRIAL:** | **Placed** |
| **3. TRIAL DATE:** | **19 Sep 2014 for final report** |
| **4. TARGET PEST:** | ***Draeculacephala clypeata, Hortensia similis* and *Tagosodes orizicolus*** |
| **5. WEEDS (INSECTICIDE)** | ***Draeculacephala clypeata, Hortensia similis* and *Tagosodes orizicolus*** |
| **6. PROTOCOL OR FINAL REPORT (ATTACHED):** | **FINAL REPORT** |
| **7. EXPECTED PAYMENT DATE:** | **IMMEDIATE** |
| **9. RESEARCHER NAME:** | **Herney Moreno – Oscar Girón** |
| **10. RESEARCHER ADDRESS:** | **Espinal, Colombia** |
| **11. NAMES OF FILES SENT** | **3845114 Final Report Acetamiprid + Novaluron Rice 19 Sep 14 OG** |
| **NOTES** | **2 location report** |

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**EFFECTIVENESS OF CORMORAN 180 EC (Acetamiprid 80 g/L + Novaluron 100 g/L)**

**IN CONTROLLING SAP-SUCKING INSECTS (*Draeculacephala clypeata,***

***Hortensia similis* and *Tagosodes orizicolus)* IN FOLIAR APPLICATIONS**

**WHEN GROWING RICE**

**DEVELOPMENT REPORT**

**RESULTS AND RECOMMENDATIONS**

**HERNEY MORENO: COMBINED INSECTICIDES IMPLEMENTATION OFFICER**

**OSCAR GIRÓN: HOT CLIMATE TECHNICAL COORDINATOR**

**AGROPROTECCIÓN ANDINA LTD.**

**COLOMBIA BRANCH**

**ESPINAL – TOLIMA**

**ACACIAS - META**

**SEPTEMBER 2014**

2

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**EFFECTIVENESS OF CORMORAN 180 EC (Acetamiprid 80 g/L + Novaluron 100 g/L) IN CONTROLLING SAP-SUCKING INSECTS (*Draeculacephala clypeata, Hortensia similis* and *Tagosodes orizicolus)* IN FOLIAR APPLICATIONS WHEN GROWING RICE**

**Summary** The tests were performed on batches of rice in Tolima and Meta. The desired objective was to evaluate Cormoran 180 EC’s control of sap-sucking insects (*D. clypeata, H. similis and T. orizicolus*) in foliar applications at dosages of 250, 300 and 350 cc/ha, setting 80% as the minimum insecticide control level. It was applied to plants for 38 days, with an average of 3 to 12 insects on each one, obtained from 5 double passes made over them with a net. The critical evaluation time was determined as being eight days.

Applications were carried out on rice plants for 38 days, with average populations of 3 to 12 insects. These conditions were ideal for testing the trial’s treatments. The critical evaluation time was found to be eight days, with an 80% minimum control threshold.

Cormoran was used at dosage levels of 300 and 350 cc/ha with average populations of sap-sucking insects of 12 individuals, with control values being obtained after 8 days, with results of 81 to 83%; this performance was surpassed by Proteus 400 cc and Nile 250 cc, with values of 90 and 87% respectively, while Imidacloprid 150 cc showed a similar control level to the Cormoran dosages. Moreover, the lower dosage of 250 cc Cormoran did not exceed the minimum threshold, as it only resulted in values of 64%.

Cormoran 300 and 350 cc had a residual effect lasting 12 to 16 days, with average control values of 86%. The remaining treatments - Rambler 300 cc/ha and Engeo 200 cc/ha - did not show effective performance against the biological target evaluated.

The study’s overall conclusion concerning the control of sap-sucking insects on rice 30 to 50 days old, gave rise to the concept that Cormoran 180 EC can be applied at dosages of 300 to 350 cc/ha when insect populations range from 3 to 12 insects, obtained from 5 double passes made over them with a net, because such dosages provide satisfactory control, exceeding 80%, with a residual effect lasting 12 to 16 days.

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**EFFECTIVENESS OF CORMORAN 180 EC (Acetamiprid 80 g/L + Novaluron 100 g/L) IN CONTROLLING SAP-SUCKING INSECTS (*Draeculacephala clypeata, Hortensia similis* and *Tagosodes orizicolus)* IN FOLIAR APPLICATIONS WHEN GROWING RICE**

**1. OBJECTIVES**

* To evaluate the effectiveness of the treatments in controlling sap-sucking insects on rice.
* To evaluate the phytotoxicity of the treatments applied when growing rice.

1.2. **DOCUMENTATION**

Annex 1. Salient photos

Annex 2. Trial protocol

Annex 3. Field data

Annex 4. Statistical analysis

Annex 5. Calibration of the application equipment

**2. MATERIAL AND METHODS**

**2.1 Table 1. Treatments applied**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **T** | **PRODUCT** | **COMBINED INSECTICIDES** | **Conc.**  **(g/L)** | **PC dosage (cc/ha)** | **Combined Insecticides dosage**  **(C.I./ha)** |
| **1** | Cormoran 180 EC | Acetamiprid + Novaluron | 80 + 100 | 250 | 20 + 25 |
| **2** | Cormoran 180 EC | Acetamiprid + Novaluron | 80 + 100 | 300 | 24 + 30 |
| **3** | Cormoran 180 EC | Acetamiprid + Novaluron | 80 + 100 | 350 | 28 + 35 |
| **4** | Nilo 300 SC | Imidacloprid + Biphentrin | 250 + 50 | 250 | 63 + 13 |
| **5** | Engeo 247 SC | Thiametoxam + Lambda-Cyhalothrin | 141 + 106 | 200 | 28 + 21 |
| **6** | Imidacloprid 350 SC | Imidacloprid | 350 | 150 | 53 |
| **7** | Proteus OD | Thiacloprid + Deltamethrin | 150 + 20 | 400 | 60 + 8 |
| **8** | Rambler 200 EC | Cypermethrin | 200 | 300 | 60 |
| **9** | Absolute control | - | - | - | - |

All the treatments were applied with the Silwet L-77 silicone additive at a dosage of 0.3 cc per liter of the mixture.

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**Table 2. Data for each location**

|  |  |  |
| --- | --- | --- |
|  | **Location One: Tolima** | **Location Two: Llanos** |
| **Farm** | El Rosal | Lote la Curva |
| **Municipality** | Espinal | Acacias |
| **Road** | Montalvo | Chichimene |
| **Type of Crop** | Rice | Rice |
| **Variety** | Fedearroz 733 | Prospera |
| **Sowing system** | In furrows, 17 cm apart | In furrows, 17 cm apart |
| **Sowing density** | 180 kg/ha | 160 kg/ha |
| **Application volume** | 159 L/ha | 159 L/ha |
| **Type of application** | Foliar coverage during the tillering stage (30-50 DAE) when the first populations of sap-sucking insects show up | |
| **Sampling method** | Netting live individuals | |
| **Evaluation intervals** | 0, 4, 8, 12 and 16 days after application was carried out | |

Leaf spraying was carried out using a 7-liter Agro Laura spray tank, at a pressure of 1 bar, with a spray boom providing 2 meter coverage, with 4 TeeJet 80-015 broadcast spray nozzles. The average mixture volume obtained was 159 L/ha. The calibration data are provided in the Annexes.

The field data obtained are as follows:

Three points were selected within each plot of land and five double passes were carried out with a net, with the number of adults and nymphs encountered being noted for all the insects caught. The species encountered were recorded using their scientific names, with a general overall count of them being taken, and a comparison was made relating to the number of adults encountered in the control plot of land compared to those found in each treatment plot, with the evaluation times being 0, 4, 8, 12 and 16 DAA. Then the statistical analysis was carried out, using a completely randomized design and an LSD (Least Significant Difference) multiple comparison test with a 95% confidence interval. For evaluating the phytotoxicity, the damage caused to the crop by each treatment was described, with evaluation intervals of 8 and 12 days after application, using the EWRC rating scale.

**EWRC (European Weed Research Council) phytotoxicity scale:**

1 = No effect (healthy plant)

2 = Very slight effects; some stunting, yellowing etc.

3 = Slight effects; clearly evident stunting and yellowing.

4 = Substantial chlorosis and/or stunting, without influencing the development of the crop.

5 = Population reduction, strong chlorosis and/or stunting that influences development.

6 = Increasing damage until arrested growth of the crop occurs.

7 = Increasing damage until partial death of the crop occurs.

8 = Increasing damage until total death of the crop occurs.

9 = Total death of the crop.

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**3. RESULTS ACHIEVED IN RELATION TO THE OBJECTIVES**

**3.1 IMPACT OF THE SAP-SUCKING INSECTS POPULATION**

In the control plot where insecticides were not applied, for trial’s insects caught using the 30 cm diameter net, namely *D. clypeata, H. similis* and *T. orizicolus,* it was found that during the 16 day evaluation period, the average numbers of insects caught there went from 17 to 34 individuals at location 1 (Tolima) and from 4 to 8 individuals at location two (Llanos), indicating that the localities were ideal for testing the treatments used in the trial.

**3.2. ANALYSIS OF THE EFFECTIVENESS OF THE TREATMENTS FOR CONTROLLING SAP-SUCKING INSECTS *(D. clypeata, H. similis* y *T. orizicolus)* ON RICE**

It should be made clear that the effectiveness analysis was conducted using the Henderson & Tilton formula, for an evaluation time in which it showed a greater controlling effect, corresponding to 8 DAA, with a minimum threshold of 80% for mobile insects. The results are shown in the following graph:

**Graph 1. LSD test (5% level) for the effectiveness averages for the control of sap-sucking insects (*D. clypeata, H. similis* and *T. orizicolus)* at Tolima**

|  |  |  |
| --- | --- | --- |
| **% control of adults according to H&T**  **90**  **80**  **70**  **60**  **50** | **80% threshold**  **CV = 12.07** | **Cormoran 250 cc**  **Cormoran 300 cc**  **Cormoran 350 cc**  **Nilo 250 cc**  **Engeo 200 cc**  **Imidacloprid 150 cc**  **Proteus 400 cc**  **Rambler 300 cc** |
|  | **0** **4** **8** **12** **16 DAA**  **Days After Application** |  |

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**Graph 2. LSD test (5% level) for the effectiveness averages for the control of sap-sucking insects (*D. clypeata, H. similis* y *T. orizicolus)* at Llanos**

|  |  |  |
| --- | --- | --- |
| **% control of adults according to H&T**  **100**  **90**  **80**  **70**  **60**  **50**  **40** | **80% threshold**  **CV = 23.1** | **Cormoran 250 cc**  **Cormoran 300 cc**  **Cormoran 350 cc**  **Nilo 250 cc**  **Engeo 200 cc**  **Imidacloprid 150 cc**  **Proteus 400 cc**  **Rambler 300 cc** |
|  | **0** **4** **8** **12** **16 DAA**  **Days After Application** |  |

In the sap-sucking insects trial at Tolima, statistically the best treatment after 8 days of spraying was Proteus at a dosage of 400 cc/ha, with 90% control values, followed by a second group with control values of 81 to 87%, which related to Nilo at a dosage of 200 cc/ha, Imidacloprid at a dosage of 150 cc/ha and Cormoran at dosages of 300 and 350 cc/ha;

A third group, for which the control level was not relevant because the control values did not exceed the minimum threshold, consisted of Rambler at a dosage of 300 cc/ha, Cormoran at a dosage of 250 cc/ha and Engeo at a dosage of 200 cc/ha.

Regarding the residual effects, it turned out that Cormoran at a dosage of 300 cc/ha equaled the residual effects of Proteus at a dosage of 400 cc/ha and Imidacloprid at a dosage of 150 cc/ha, with controls being carried out up to 16 days with values from 81 to 83%.

For the Llanos zone, the best treatment was Nilo 250 at a dosage of cc/ha which achieved overwhelming control results of 100% on day 8, with Cormoran holding second place at dosages of 250 to 350 cc/ha, along with Proteus at a dosage of 400 cc/ha, with values from 87 to 96% that exceeded the minimum control threshold.

In third place were Imidacloprid at a dosage of 150 cc/ha, Engeo at a dosage of 200 cc/ha and Rambler at a dosage of 300 cc/ha, with control that was not noteworthy due to it not exceeding the minimum threshold, with control values of 70 to 76% on day 8.

With regard to the residual effects for this zone, it was found that Cormoran at dosages of 300 and 350 cc/ha had a controlling effect up to 12 days, with values of 92 to 96%, equaling Proteus at a dosage of 400 cc/ha, at the same time exercising 4% less control than Nilo at a dosage of 250 cc/ha.

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**4. PHYTOTOXICITY**

In relation to toxicity, none of the treatments applied showed any damage to the leaf area of the rice crops in either location, meaning they had a score of 1 on the toxicity table (1 = no effects).

**5. DISCUSSION AND CONCLUSIONS**

The conclusions are as follows:

The applications were carried out on rice plants that had emerged 38 days before, with average populations of 3 to 12 sap-sucking insects (*Draeculacephala clypeata, Hortensia similis* and *Tagosodes orizicolus)* for each of the 5 double passes made over them with a net. These conditions were ideal for testing the trial’s treatments. The critical evaluation time was determined as being eight days, with a minimum control threshold of 80%.

It was found that, at dosages of 300 and 350 cc/ha, with average sap-sucking insect populations of 12 individuals, Cormoran achieved control levels after 8 days of 81 to 83%; this performance was exceeded by Proteus at a dosage of 400 cc/ha and Nilo 250 cc/ha, with values of 90 and 87% respectively, while Imidacloprid at a dosage of 150 cc/ha showed a control level similar to these Cormoran dosages. Furthermore, the lower 250 cc/ha dosage of Cormoran did not exceed the minimum threshold due to it only generating control values of 64%.

Moreover, the remaining treatments of Rambler at a dosage of 300 cc/ha and Engeo at a dosage of 200 cc/ha did not show effective performance against the biological target evaluated.

It was found that Cormoran at dosages of 300 and 350 cc/ha had a residual effect lasting 12 to 16 days at both locations, with average control values of 86%. With regard to phytotoxicity, none of the treatments applied showed any damage to the rice crop plants.

The general conclusion of the trial was that, at dosages of 250 to 350 cc/ha, Cormoran had an effectiveness performance above the minimum threshold of 80% after 8 days, although with populations of sap-sucking insects that did not exceed 3 individuals on average for each 5 double passes made over them with a net, given that the higher the population is, the effectiveness falls slightly.

**6. RECOMMENDATIONS:**

Following the study concerning controlling mobile sap-sucking insects (*D. clypeata, H. similis* and *T. orizicolus)*, carried out in the Tolima and Meta zones on rice crops with plants 30 to 50 days old, it is recommended that Cormoran 180 EC be applied in dosages of 300 to 350 cc/ha for initial applications when the populations of these insects amount to 3 to 12 insects, obtained from 5 double passes made over them with a net, due to the fact that these dosages provide satisfactory control levels exceeding 80%, with a residual effect that lasts 12 to 16 days.

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**ANNEXES.**

**ANNEX 1. SALIENT PHOTOS TAKEN 8 DAYS AFTER APPLICATION**

|  |  |
| --- | --- |
| Application of Cormoran 180 EC at a dosage of 250cc | Application of Cormoran 180 EC at a dosage of 300cc |
| Application of Cormoran 180 EC at a dosage of 350cc | Application of Nilo 300EC at a dosage of 250cc |
| Application of Engeo 247EC at a dosage of 200cc | Application of Imidacloprid 350EC at a dosage of 150cc |

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**ANNEX 2. DEVELOPMENT PROTOCOL**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **CODE** | | **3845114 Cormoran Rice Sap-Sucking Insects 27 Mar-14** | | | | | |
| **TITLE** | | Effectiveness of Cormoran 180 EC in controlling sap-sucking insects *(Draeculocephala clypeata, Hortensia similis, etc)* in foliar applications when growing rice | | | | | |
| **SPECIFIC OBJECTIVES** | | 1. To evaluate the effectiveness of the treatments in controlling sap-sucking insects on rice.  2. To evaluate the toxicity of the treatments applied when growing rice. | | | | | |
| **LOCATION** | | One location in each zone | | | | | |
| **CROP** | | Commercial varieties of rice | | | | | |
| **TYPE OF APPLIC.** | | Foliar coverage, during the tillering stage (30-50 DAE), when the first populations of sap-sucking insects show up. | | | | | |
| **TARGET** | | Sap-sucking insects on rice: leafhoppers, green leafhoppers and rice delphacids (*Draeculocephala clypeata, Hortensia similis* and *Tagosodes orizicolus)* | | | | | |
| **STAT. DESIGN** | | Pairwise. A Comparative Analysis is assumed, with 9 Tr x 3 Rep. ANOVA and LSD test (5% level). | | | | | |
| **PLOT** | | Plot measuring 10 x 15 m. Control plot measuring 6 m2 | | | | | |
| **TREATMENTS TABLE** | | | | | | | |
| **T** | **PRODUCT** | | | **Combined Insecticides** | **Conc. (g/L)** | **PC Dosage (cc/ha)** | **Combined Insecticides dosage**  **(C.I. g/ha)** |
| **1** | Cormoran 180 EC | | | Acetamiprid + Novaluron | 80+100 | 250 | 20 + 25 |
| **2** | Cormoran 180 EC | | | Acetamiprid + Novaluron | 80+100 | 300 | 24 + 30 |
| **3** | Cormoran 180 EC | | | Acetamiprid + Novaluron | 80+100 | 350 | 28 + 35 |
| **4** | Nilo 300 SC | | | Imidacloprid + Biphenthrin | 250+ 50 | 250 | 63 + 13 |
| **5** | Engeo 247 SC | | | Thiametoxam + Lambda-Cyhalothrin | 141+ 106 | 200 | 28 + 21 |
| **6** | Imidacloprid 350SC | | | Imidacloprid | 350 | 150 | 53 |
| **7** | Proteus OD | | | Thiacloprid + Deltamethrin | 150 + 20 | 400 | 60 + 8 |
| **8** | Rambler 200 EC | | | Cypermethrin | 200 | 300 | 60 |
| **9** | Absolute control | | | - | - | - | - |
| **MIXTURE** | | | Water + Insecticide + Additive | | | | |
| **ADDITIVE** | | | Apply Silwet L-77 at a dosage of 0.3 cc/liter of water for the final mixture. | | | | |
| **No. OF**  **APPLICATIONS** | | | Foliar application, providing full coverage, during the tillering stage (30-50 DAE), when the first populations of sap-sucking insects show up. | | | | |
| **MIXTURE VOL.** | | | It will be calibrated to obtain 130 to 160 l/ha. | | | | |
| **APPLICATION EQUIPMENT** | | | The name of the equipment, the nozzles, the operating pressure and the final discharge are to be noted down. | | | | |
| **VARIABLES**  **TO BE EVALUATED** | | | Objective 1. Effectiveness in controlling sap-sucking insects: 3 points are selected within each plot of land and five (5) double passes are carried out with a net, noting down the number of adults and nymphs encountered, recorded using their scientific names, with a general overall count of them being taken. Comparison is made relating to the number of adults encountered in the control plot of land compared to those found in each treatment plot.  Objective 2: Phytotoxicity. In each plot, possible damage is noted down in accordance with the EWRC rating scale. | | | | |
| **EVALUATION** | | | Effectiveness: 0, 4, 8, 12 and 16 DAA - Toxicity: 8 and 12 DAA. | | | | |

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**ANNEX 3. FIELD DATA**

**FIELD DATA FOR SAP-SUCKING INSECTS (*D. clypeata, H. similis* and *T. orizicolus)***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **LOCATION ONE: ESPINAL VEREDA MONTALVO** | | | | | | | |
| Average No. of sap-sucking insects obtained from 5 double passes | | | | | | | |
| with a net at 3 sites per plot | | | | |  |  |  |
|  |  |  | Days after application | | | | |
|  |  |  | 0 | 4 | 8 | 12 | 16 |
|  | **Tr** | **Re** | **Ev0** | **Ev1** | **Ev2** | **Ev3** | **Ev4** |
|  | **1** | **1** | 10 | 8 | 5 | 9 | 9 |
| Cormoran | **1** | **2** | 12 | 6 | 9 | 9 | 10 |
| 250 cc | **1** | **3** | 12 | 3 | 5 | 7 | 9 |
|  | **2** | **1** | 12 | 4 | 3 | 3 | 4 |
| Cormoran | **2** | **2** | 12 | 8 | 3 | 4 | 3 |
| 300 cc | **2** | **3** | 11 | 5 | 4 | 5 | 5 |
|  | **3** | **1** | 10 | 4 | 1 | 2 | 3 |
| Cormoran | **3** | **2** | 10 | 5 | 6 | 5 | 9 |
| 350 cc | **3** | **3** | 10 | 4 | 1 | 2 | 3 |
|  | **4** | **1** | 8 | 2 | 1 | 3 | 3 |
| Nilo | **4** | **2** | 10 | 3 | 3 | 4 | 5 |
| 250 cc | **4** | **3** | 11 | 1 | 2 | 5 | 6 |
|  | **5** | **1** | 11 | 6 | 7 | 5 | 6 |
| Engeo | **5** | **2** | 12 | 4 | 7 | 6 | 6 |
| 200 cc | **5** | **3** | 12 | 3 | 8 | 11 | 12 |
|  | **6** | **1** | 12 | 2 | 4 | 4 | 5 |
| Imidacloprid | **6** | **2** | 11 | 2 | 2 | 3 | 3 |
| 150 cc | **6** | **3** | 10 | 3 | 2 | 3 | 4 |
|  | **7** | **1** | 10 | 2 | 1 | 1 | 2 |
| Proteus | **7** | **2** | 11 | 7 | 0 | 2 | 3 |
| 400 cc | **7** | **3** | 9 | 2 | 3 | 4 | 5 |
|  | **8** | **1** | 14 | 10 | 6 | 6 | 6 |
| Rambler | **8** | **2** | 14 | 13 | 5 | 9 | 11 |
| 300 cc | **8** | **3** | 14 | 13 | 5 | 10 | 10 |
|  | **9** | **1** | 17 | 20 | 25 | 29 | **33** |
| **Control** | **9** | **2** | 16 | 21 | 26 | 32 | **34** |
|  | **9** | **3** | 18 | 20 | 27 | 34 | **36** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **LOCATION TWO: CHICHIMENE - ACACIAS** | | | | | | | |
| Average No. of sap-sucking insects obtained from 5 double passes | | | | | | | |
| with a net at 3 sites per plot | | | | |  |  |  |
|  |  |  | Days after application | | | | |
|  |  |  | 0 | 4 | 8 | 12 | 16 |
|  | **Tr** | **Re** | **Ev0** | **Ev1** | **Ev2** | **Ev3** | **Ev4** |
|  | **1** | **1** | 4 | 4 | 0 | 1 | 4 |
| Cormoran | **1** | **2** | 3 | 3 | 1 | 1 | 3 |
| 250 cc | **1** | **3** | 3 | 3 | 1 | 1 | 2 |
|  | **2** | **1** | 3 | 4 | 0 | 0 | 4 |
| Cormoran | **2** | **2** | 4 | 3 | 0 | 0 | 2 |
| 300 cc | **2** | **3** | 4 | 3 | 1 | 1 | 2 |
|  | **3** | **1** | 4 | 2 | 0 | 1 | 2 |
| Cormoran | **3** | **2** | 3 | 3 | 1 | 0 | 2 |
| 350 cc | **3** | **3** | 3 | 2 | 0 | 0 | 3 |
|  | **4** | **1** | 3 | 1 | 0 | 0 | 2 |
| Nilo | **4** | **2** | 3 | 0 | 0 | 0 | 1 |
| 250 cc | **4** | **3** | 4 | 1 | 0 | 0 | 2 |
|  | **5** | **1** | 3 | 0 | 0 | 1 | 2 |
| Engeo | **5** | **2** | 2 | 0 | 2 | 1 | 3 |
| 200 cc | **5** | **3** | 2 | 0 | 0 | 1 | 2 |
|  | **6** | **1** | 4 | 0 | 0 | 1 | 2 |
| Imidacloprid | **6** | **2** | 4 | 0 | 1 | 1 | 3 |
| 150 cc | **6** | **3** | 3 | 2 | 3 | 3 | 4 |
|  | **7** | **1** | 4 | 0 | 0 | 0 | 4 |
| Proteus | **7** | **2** | 3 | 3 | 0 | 0 | 3 |
| 400 cc | **7** | **3** | 3 | 2 | 1 | 1 | 3 |
|  | **8** | **1** | 2 | 2 | 1 | 1 | 3 |
| Rambler | **8** | **2** | 2 | 2 | 1 | 2 | 2 |
| 300 cc | **8** | **3** | 4 | 4 | 2 | 1 | 4 |
|  | **9** | **1** | **4** | **6** | **7** | **6** | **8** |
| **Control** | **9** | **2** | **5** | **6** | **7** | **8** | **8** |
|  | **9** | **3** | **3** | **6** | **6** | **7** | **9** |

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**ANNEX 4. STATISTICAL ANALYSIS**

**STATISTICAL ANALYSIS FOR EFFECTIVENESS AGAINST SAP-SUCKING INSECTS (*D. clypeata, H. similis* and *T. orizicolus).* Location One: Tolima**

|  |
| --- |
| **Completely Randomized AOV for Ev2 = 8 days**  **Source DF SS MS F P**  Tr 8 18885.6 2360.70 33.65 0.0000  Error 18 1262.7 70.15  Total 26 20148.3  Grand Mean 69.370 CV 12.07  **LSD All-Pairwise Comparisons Test of Ev2 by Tr**  **Tr Mean Homogeneous Groups**  7 90.333 A  4 87.333 AB  6 84.333 AB  3 83.000 AB  2 81.333 AB  8 75.000 BC  1 64.000 CD  5 59.000 D  9 0.0000 E |

**STATISTICAL ANALYSIS FOR EFFECTIVENESS AGAINST SAP-SUCKING INSECTS (*D. clypeata, H. similis* and *T. orizicolus).* Location Two: Llanos**

|  |
| --- |
| **Completely Randomized AOV for Ev2 = 8 days**  **Source DF SS MS F P**  Tr 8 22443.2 2805.40 8.89 0.0001  Error 18 5682.7 315.70  Total 26 28125.9  Grand Mean 76.926 CV 23.10  **LSD All-Pairwise Comparisons Test of Ev2 by Tr**  **Tr Mean Homogeneous Groups**  4 100.00 A  2 96.000 A  7 94.333 A  3 92.000 A  1 86.333 A  6 77.333 A  5 76.333 A  8 70.000 A  9 0.0000 B |

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