



NATIONAL AGRICULTURAL UNIVERSITY LA MOLINA PHYTOPATOLOGY SPECIALTY, Lima Peru.

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IDENTIFICATION AND CONTROL OF FOLIAR SPOT PATHOGEN IN *Tagetes erecta* L.

Marigold is an industrial and exportation crop due to the content of Xanthophylls in the petal of the flowers. Such compound is used in the production of colorants and flour to manufacture animal feed (11). This crop is affected by several facts that decrease the quality and production of the inflorescences; one of these facts are the diseases caused by fungus, and between them, foliar spot is the most important because it is present in all plant development stages. The objectives of this research work were: a) Isolate and identify the pathogenic genus that affects Marigold (*Tagetes erecta* L.) in the production field on the coast area. b) To determine the transmission by seed, c) to determine the range of hosts, d) to select “in vitro” the fungicides and biological control that act against the pathogen e) to evaluate on the field fungicide efficacy and biological control selected “in vitro”.

The present study was done in two stages: Laboratory stage was performed on La Molina University laboratory, and the field trial was done in “Pampa velarde” (Barranca). To determine the pathogen, leaves, stalks and seeds from the variety “Bella Flor” were sampled on areas like Barranca, Chimbote y Puente Piedra. The samples were disinfected and sown in culture medium papa dextrose agar (PDA), once the isolation was gotten, it was sown in the culture media Juice V8 (VB8), Papa Dextrose Agar (PDA), Oat Meal Agar (OMA), Corn Meal Agar (CMA) y Sucrose Agar Carbonato de calcio (SAC) (12,17). It was shown that the media PDA, Jugo V8, CMA y OMA, obtained good development of the mycelium but did not allow the sporulation. The media SCA was the only one where the fungus got to sporulation. Sporulation happened approximately after 48 to 72 hours, at a temperature of 18+/-3° C (23), on the surface of each block agar, it was observed a lot of conidia. Pathogen identification was done by Ellis y Barron procedure (3,8,9). The seeds were analyzed by toilet paper method and culture media (PDA) (17), where it was found the transmission by seed (30%).

In the test control “in vitro” there were selected contact and systemic fungicides were it was prepared an inoculated media (12) considering low and high dose according to the recommendations of the manufacturer. The fungicide treatments were: Propineb (Antracol), Albesilate Mancozeb (Dithane), Tolyfluandid (Euparan multi), Ziram (Fungitox), Mancozeb (Manzeb), Mancozeb (Mancozil), NF-149 WDG, Mancozeb (Quimizeb), Iprodione (Rovral), Mancozeb (S-kekura), Procimidona (Sumisclex), N-alquildimetil (PRONTECH), Tebuconazole (Folicur PM), Isoprotiolane (Fuji one), Sulfato de Cu (Phyton), Procloraz (Sportak), Difenconazole (Score). Contact fungicides like Antracol, Bellkute, Brestan, Dithane, Fungitox, Manzeb, Mancozil, Quimizeb, S-kekura y PRONTECH 2, produced an inhibition on fungus growing in high and low doses. Bravo, Captan, Champion, Euparen Multi, Rovran, Sumisclex y PRONTECH 1, got an 85 to 90% of inhibition. The treatment with NF-149 WDG, just had a 28% of control over the pathogen growing. For the systemic fungicides the treatments that got 100% of inhibition of the pathogen were Folicur, Score y Sportak. The treatments Fuji one and Phyton 25 produced approximately 77 a 95% of control. The test concluded up to 12 days when the control filled completely the plate.

On the field trial it was determined the efficacy of five contact fungicides (Antracol, Dithane, Fungitox, Quimizeb Cu and PRONTECH), 3 systemic fungicides (Folicur, Sportak y Score) selected on the “in vitro” test and three different density of soil (0.15 m., 0.20 m., 0.30m.). Statistical design was on blocks with factorial arrangement with a total of 24 treatments. (Fungicide + density) and the control. The experimental unit was plants located in tree lines of 4.2 meters long and 2.4 meters wide, with a total surface of 11m². The application of each fungicide treatment was every 7 days for the contact fungicides and 14 days for the systemic and it was done with backpack spray machine. The parameter of evaluation was the percentage of foliar area affected by *Alternaria* sp using the

Henfling scale (15) that was modified and considers: 1=0%, 2=1%, 3=10%, 4=25%, 5=50%, 6=75% y 7=100%. With the value of the percentage of the foliar area affected it was calculated under the curve of the disease (6). The results show that all the treatments had a control of the disease in comparison with the control. Contact fungicides PRONTECH, Quimizeb y Dithane got 73 to 81.91% of control of the disease, followed by fungitox and Antracol that just got a 69% control of the disease. From the systemic fungicides Score showed 90.93 to 96.39% of control of the disease and Folicur showed 87.75 to 91.34%, followed by sportak that showed the less percentage (74.73 – 78.82 %) of control. These fungicides

obtained equal behavior on the three different densities of soil.

In regards to the yield for the fact of distance, it is shown that the levels under study shown a significative difference between them, showing the best results of inflorescence with the distance of 0.20 mm, for all the treatments on the study. The higher yield was 21.413 kg/Ha y 20556 Kg/ha on the parcels treated with PRONTECH and Score respectively, followed by folicur, Dithane and Quimizeb, that were over the control that showed 17 216 kg/Ha. The treatments with biological control obtained average yield of 17 200 kg/Ha.

The following graph was built by the technical department of UPI based on the results provided by The National Agricultural University la Molina. The graph shows the high yield of production when the PRONTECH treatment is applied.

Yield of production in Marigold flowers. Comparative Chart

Treatment	Yield (Kg/HA)	Yield (Kg/Acre)
PRONTECH	21413	8669.23
Score	20556	8322.27
Dithane	18500	7489.88
Quimizeb	18480	7481.78
Folicur	18023	7296.76
B subtilis	17252	6984.62

This study was conducted in Peru, for a large producer of Marigold Flowers.

