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Demonstration of Recommended Fungicides against Onion Purple Blotch Disease in Fogera Plains, Ethiopia

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Abstract

This study was planned to demonstrate recommended fungicides for onion purple blotch disease management in Dera, Fogera, and Libo Kemkem districts. Different frequency of recommended fungicides for onion purple blotch Diprocon 33 EC (Difenoconazole) and Natura 250 EW (Tebuconazole) were demonstrated and evaluated with unsprayed plot. For the study period from demonstration plots, yield and disease data were collected. From the findings of this research, it was observed that there was a difference among the fungicide frequencies used for the demonstration in the study area. The lowest average disease severity and highest yield was observed on plots with two and three sprays of Tebuconazole and Difenoconazole fungicides. Economic analysis revealed that the highest (2924.67 %) Marginal rate of return was obtained from in case of two sprays of Tebuconazole followed by two spray of Difenoconazole (2739.33%) at 15 days intervals. In other word investing one Ethiopian Birr (EtB) to spray Tebuconazole and Difenoconazole, at two frequencies provided 29.25, and 27.39 extra net benefit of EtB in the study area. Therefore, the two fungicides Tubuconazol and Difenoconazol with two frequencies were recommended for the study area to control purple blotch of onion. Thus, offices of agriculture and research centers need to provide technical support to the farmers on diseases symptom, time of diseases appearance and proper fungicide application method through different educational and extension method to manage the diseases.

Introduction

Onion (Allium cepa L) is one of the most popular vegetables in the world. In Ethiopia Productivity of the crops are low, even below the world and African averages [1]. There are many factors contributing to low yield of onion in Ethiopia, of which purple blotch (Alternaria porri) is the major disease of onion attacking the plant at bulb initiation stage [2]. It attacks leaves, bulb and seed stalks and subsequently reduces yield and quality. In the initial symptom, small whitish sunken spot appear on the leaves. Later, the spot turns purple and is surrounded by chlorotic areas. At severe infestation the whole leaves turns brown and dries. It is responsible for causing severe yield losses ranging from 2.5% to 97% in both the bulb and seed crop [3,4]. The efficacy of some fungicides against purple blotch has been reported [5,6,7]. The triazole Fungicides, Tebuconazole

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and Difenoconazole proved superior in inhibiting growth of A. porri and S. vesicarium under in vitro conditions, respectively. Further, foliar sprays (3 for bulb crop and 4 for seed crop) of tebuconazole 25 EC (Folicur) @ 0.1 per cent at fortnightly interval most effectively managed purple blotch complex of onion under field conditions with highest Benefit: Cost ratio (8.75:1 and 88.7:1) in bulb and seed crop, respectively [8] . Due to the risk of purple blotch, the farmers are not able to cultivate onion during the main rainy season in Fogera plain. However, there is inadequate information with regard to recommended fungicides for onion purple blotch disease management. In order to overcome the problem, the present study was undertaken to evaluate and demonstrate recommended fungicides for onion purple blotch disease management.

Materials and methods

The demonstration was conducted for one year (2020-2021) in Fogera, Dera and Libo kemkem districts of Fogera plain. Three farmers were selected based on their interest to the technology, model farmers, managing the experiment and have appropriate land for the experiment. Seed of onion was obtained from local market. Seedlings were raised at the Fogera center following recommended nursery management practices. Different frequency of recommended fungicides for onion purple blotch Diprocon 33 EC (Difenoconazole) and Natura 250 EW (Tebuconazole) were demonstrated and evaluated with unsprayed plot . For the study period from demonstration plots, yield and disease data were collected. Essential advice from respective researchers and agricultural experts has been given to demonstration host farmers. During each visit, discussions were made with the farmers and DAs right on the demonstration plot to jointly evaluate the effectiveness of fungicides on the field.

Results and discussion

Effects of fungicides on percent disease control

The results (Figure 1) showed that all the fungicides and their respective frequency reduced the disease severity in comparison to untreated control. Minimum average disease severity (10 %) was observed when the plots were sprayed three times with Tebuconazole followed by two sprays of Tebuconazole (11.67%), three sprays of Difenconazole (12.5 %) and two sprays of Difenconazole (13.33 %). Maximum average disease severity was observed on plots sprayed with one time Difenconazole (32.5 %) followed by Tebuconazole (31.67 %).

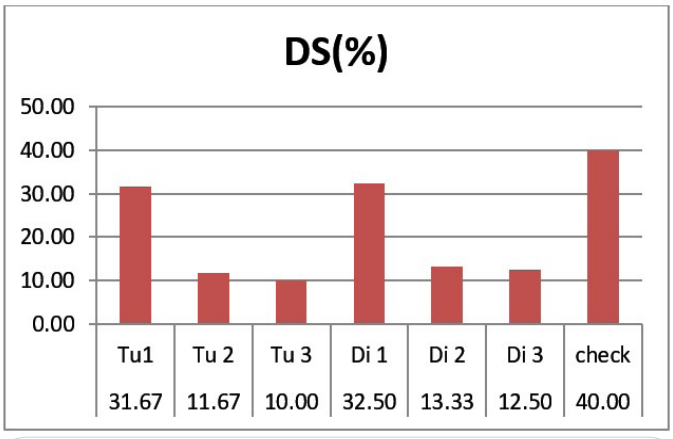

Figure 1: Average terminal diseases severity.

Note: DS: Average Disease Severity; Tu: Tubuconazol; Di: Difenoconazol; 1: One Spray; 2: Two Sprays; 3: Three Sprays.

Effects of fungicides on yield and economics of onion cultivation

The effect of fungicides that reduced the purple blotch of onion was also reflected ultimately on bulb yield. All the fungicides had increased the bulb yield differently in comparison to untreated control. Maximum bulb yield was harvested on three sprays of Tebuconazole plots (111.1 q/ha) followed by three sprays of Difenconazole (109.54 q/ha), two sprays of Tebuconazole plots (109.26 q/ha) and two sprays of Difenconazole plots (106.48 q/ha) (Figure 2).

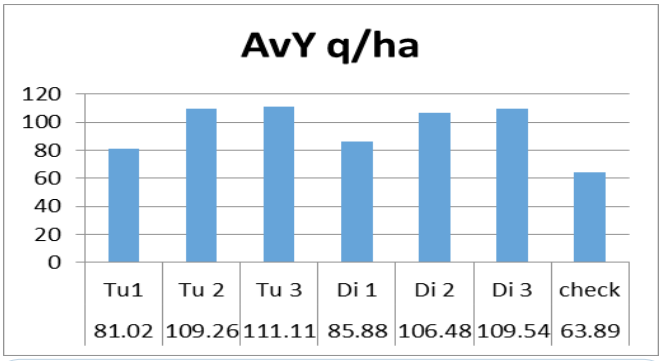

Figure 2: Average demonstration yield of onion.

Note: AvY: Average Yield; Tu: Tubuconazol; Di: Difenoconazol; 1: One Spray; 2: Two Sprays; 3: Three Sprays.

Economic analysis revealed that the highest (223,280 ETB/ha) net benefit was obtained from three sprays of Difenoconazole plot followed by two and three sprays of Tebuconazole plots. Marginal rate of return was the highest (2924.67 %) in case of two sprays of Tebuconazole at 15 days intervals followed by two spray of Difenoconazole (2739.33%). In other word investing one Ethiopian Birr (EtB) to spray Tebuconazole and Difenoconazole, at two frequencies provided 29.25, and 27.39 extra net benefit of EtB in the study area.

Training of farmers and other stakeholders

Training on diseases symptom, time of diseases appearance, fungicides (Tebuconazole and Difenoconazole) and proper application method were given to field day invited farmers (40) development agents (6) and experts of districts (3) who were working in the study site. This includes both theoretical and practical types of training (Figure 3).

Figure 3: Farmers, Development Agents and Woreda Experts on training of practical training on field day prepared at Dera and Fogera Districts.

Conclusion and recommendation

From the findings of this research, it was observed that there was a difference among the fungicide frequencies used for the demonstration in the study area. The lowest average disease severity and highest yield was observed on plots with two and three sprays of Tebuconazole and Difenoconazole fungicides. Economic analysis revealed that the highest (2924.67 %) Marginal rate of return was obtained from in case of two sprays of Tebuconazole followed by two spray of Difenoconazole (2739.33 %) at 15 days intervals. In other word investing one Ethiopian Birr (EtB) to spray Tebuconazole and Difenoconazole, at two frequencies provided 29.25, and 27.39 extra net benefit of EtB in the study area. Therefore, the two fungicides Tubuconazol and Difenoconazol with two frequencies were recommended for the study area to control purple blotch of onion. Thus, offices of agriculture and research centers need to provide technical support to the farmers on diseases symptom, time of diseases appearance and proper fungicide application method through different educational and extension method to manage the diseases.

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