# EVALUATION OF THE EFFECT OF CHEMICALS USED AS SEED DRESSING FOR THE CONTROL OF BERSEEM ROOT ROT

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خلاصہ

سیڈ ٹریٹمنٹ کے طور پہ استعمال ہونیوالی مختلف فنجیسائیڈز کو برسیم روٹ راٹ بیماری کو کنٹرول کرنے کیلئے پرکھا گیا-اس کیلئے کاربینڈازم بحساب 50-2 گرام، تھائیوفینیٹ میتھائیل بحساب50-2 گرام، امیڈاکلوپرڈ سےجمع بیو کونازول بحساب4 ملی لیٹر اور برو موتھیلانل بحساب50-2 گرام فی کلو گرام برسیم کے بیج کو فصل بونے سے قبل لگائی گئیں- تمام فنجیسائیڈز نے برسیم روٹ راٹ بیماری کو بہتر طور پر کنٹرول کیا تاہم برو موتھیلانل نے سب سے اچھا نتیجہ دیا-

**Abstract**

Evaluation of different fungicides against berseem root rot disease was carried out at Adaptive Research Farm, Gujranwala. The traditional berseem variety harroo was planted in the month of October by following Randomized Complete Block Design (RCBD) with three repeats. Before sowing the seeds were treated with chemicals containing active ingredients i.e., carbendazim, thiophenate-methyle, imidacloprid+tebuconazole and bromothalanil at the rates of 2.50 gm, 2.50 gm, 4.00 ml and 2.50 gm per kg of berseem seed respectively. All the treatments proved significantly efficient over control in reduction of berseem root rot level. The treatment involving bromothalnil proved superior over all the treatments and reduced berseem root rot infection to a considerable extent with maximum green fodder yield. But on the basis of cost benefit ratio thiophenate-methyle proved the most economical followed by bromothalnil. Hence these two fungicides can safely be recommended for seed treatment for the control of berseem root rot disease in berseem fodder crop.
**Key words:** berseem root rot, fodder yield, fusarium, harroo berseem, winter fodder

## Introduction

Berseem (*Trifolium alexandrinum* L.) is grown in many parts of the world. It is one of the most important winter fodder crop in irrigated areas of Pakistan (Stoltz and Wallenhammar, 2012). The importance of the crop lies in its multi-cut nature, availability for long duration as green fodder, high green fodder yield and good forage quality. Because of its high digestibility & palatability it is known as milk multiplier (Naeem *et al*., 2006; Anonymous, 2008). On the basis of its characteristic features it can be regarded as king of winter fodders in Pakistan.

Forage yield potential of berseem ranges from 100-150 ton $ha^{-1}$.The factors responsible for this yield gap are; low yield potential of verities, imbalance use of fertilizers and attack of diseases. Among the diseases the stem and root rot diseases are most important. These diseases hinders crop establishment, destroy forage quality, reduced green fodder and seed yield. The economic and fodder yield losses may range from 0-60% (Malviya *et al*., 1999; Rathi *et al*., 2007).

The berseem root rot is a complex soil-borne disease incited by *Rhizoctonia solani*, *Fusarium spp.*, *Sclerotium bataticola* and *Tylenchorhynchus vulgaris* (Bhaskar and Ahmad, 1991; Bhaskar *et al*., 2003; Inam and Khan, 2008). This can be a potential threat to berseem production and may leads to a hidden hunger as the farmers can't identify from simple soil tests (Sheep, 2015).

One way to increase forage production is by reducing the losses caused by these diseases. Therefore, an experiment was designed to investigate the effect of some chemicals for the control of berseem root rot and to search out the most suitable and economic chemical ensuring maximum control of the disease.

**Materials and Methods**

The trial regarding evaluation of different fungicides for the control of berseem root rot was laid out in randomized complete block design with three replications having plot size of 8x15 m. The experiment was conducted at adaptive research farm in district Gujranwala during Rabi seasons of 2014-15, 2015-16 and 2016-17 on the same fields where a rotation of berseem-rice-berseem was followed. The promising berseem cultivar "harroo berseem" was planted in the mid of October in each study year. The healthy and pure berseem seed was used @20kg/ha. All the other agronomic practices were kept same for all the treatments except the treatments under test. The treatments tested are listed in the Table 1. While variation amoung treatment due to rat rot were shown in Table 2.

Data collection and analysis: Data of berseem root rot was recorded regularly at fortnight interval during the whole course of study. The disease appeared just before the second cut. The data of diseased area was measured after last cut. For this purpose the data pertaining to berseem rot was recorded from randomly selected three spots from each replication. The %age of diseased area with respect to total plot size was calculated for each year. Then the means of all these three values were calculated for further use in statistical analysis.

In order to calculate the fodder yield $ha^{-1}$ the full grown berseem fodder was cut from an area of $1m^2$, from different four spots from each replication at random at each cut of berseem fodder. This data was then used to convert the fodder yield into ton $ha^{-1}$. The economics of the pesticides used for seed treatment was determined on the basis of cost benefit ratio.

A statistical software “statistics” was used for data analysis. The significant differences among means were compared by using LSD.

**Results and Discussion**

The differences among treatments due to root rot were statistically significant (Table 2). The overall incidence of root rot in 2014-15 and 2016-17 was high as compared to that in the year 2015-16. In all the study years the prevalence of disease remained below with Terranil followed by Topsin-M as compared to other tested chemicals. The same trend was seen in the mean values of the data over the span of the three years.

It is important to mention that the values for disease incidence for the control plot were significantly higher as compared to other tested treatments. Also the disease incidence in all the treatments except control showed a decreasing trend over the years. It means the all the pesticides remained successful against fungus and did not allow buildup of its inoculum in the soil over the period of three study years. But this was not in case of control plot where build up inoculum showed an increasing trend with the passage of time. It means that the tested fungicides have the ability to retard the accumulation of inoculum in berseem fields. Results on similar lines were obtained by Inam and Khan (2000), who evaluated that Benlate, Brassical and Derosal were most efficacious fungicide for control of root rot disease in fodder crop.

Table 2 shows that the root rot disease incidence ranged from 14 to 55% which is in accordance with the findings of Chaudhry *et al*., (1992) who reported that infection of berseem root rot may reach upto 58%.

As for as the berseem fodder yield is concerned all the treatments were significantly different from each other (Table 3). The fodder yield however was maximum with the seed treated with Terranil followed by Hombre, Topsin-M and Curator with 11.37, 3.94, 2.98 and 2.25%, respectively. Whereas, in control plot the berseem fodder yield was lowest as compared to the tested fungicides. This was because the fungus causing the root rot caused the necrosis and ultimately death of the plants. On the contrary in the plots treated with fungicides the fungus inoculum decreased over the years resulting in an increasing trend in berseem fodder yield over the course of time.

Table 3 also indicates that berseem fodder yield ranged from about 74 tons/ha (control) to 88 tons/ha with Terranil. However the mean fodder yield ranged from 76 tons/ha (control) to 86 tons/ha with Terranil. The results are agreed with Inam and Khan (2000) who also reported carbendazim as least effective in root rot control. They described that Benlate (benomyl), Brassicol (quintozene) and Derosal (carbendazim) gave significantly higher green yield of 112, 95 and 85 t/ha, respectively, compared with 77 t/ha for the control. These results are partially in accordance with the findings of Bhaskar *et al*., (2003) and Pande *et al*., (2008) who reported highest control and fodder yield after treating the berseem seed with carbendazim.

On the basis of cost benefit ratio the seed treatment with fungicide Topsin-M appeared the most economical as compared to other tested fungicides followed by Terranil, Curator and Hombre (Table 4).

**Table.1 Fungicides active ingredients and cost per acre for recommended doses**

| Treatment | Fungicides | Active ingredient | Name of pesticide distributer & (Price Rs./pack) | Dose/ kg seed | Cost of seed treatment (Rs)/ha |
|---|---|---|---|---|---|
| T1 | Control | - | - | - | - |
| T2 | Curator 50 WP | carbendazim | Hextar chemicals enterprises (Rs 395/250gm) | 2.50 gm | 32 |
| T3 | Topsin-M 70 WP | thiophenate-methyle | Arysta LifeScinces (Rs 800/400gm) | 2.50 gm | 40 |
| T4 | Hombre 18.625 FS | imidacloprid+ tebuconazole | Bayar CropScience (Rs 1340/200ml) | 4.00 ml | 134 |
| T5 | Terrannil 45DP | bromothelanil | KanzoAg (Rs. 268/50gm) | 2.50 gm | 107 |

**Table 2. Intensity (%age) of berseem root rot disease after berseem seed treatment**

| Treatment | Fungicides | 1st Year (RABI 2014-15) | | 2nd Year (RABI 2015-16) | | 3rd Year (RABI 2016-17) | | Mean value of three years data | |
|---|---|---|---|---|---|---|---|---|---|
| T1 | Control | 41.60 | a | 39.79 | a | 55.44 | a | 45.61 | a |
| T2 | Curator 50 WP | 29.79 | b | 19.94 | b | 28.04 | c | 25.92 | b |
| T3 | Topsin-M 70WP | 25.76 | bc | 15.00 | d | 20.76 | d | 20.51 | c |
| T4 | Hombre 18.625 FS | 27.80 | bc | 17.02 | c | 31.65 | b | 25.49 | b |
| T5 | Terranil 45DP | 23.20 | c | 13.60 | d | 17.00 | e | 17.93 | d |
| | LSD | 5.708 | | 3.007 | | 2.475 | | 2.579 | |

Note: Means followed by the same letter in a column are not significantly different ($P< 0.05$)

**Table 3. Comparison of berseem fodder yield sown after seed treatment against berseem root rot**

| Treatment | Fungicides | 1st Year (RABI 2014-15) | 2nd Year (RABI 2015-16) | 3rd Year (RABI 2016-17) | Mean fodder yield (tons)/ha | | % change in yield over the control |
|---|---|---|---|---|---|---|---|
| | | Fodder yield (tons) /ha | Fodder yield (tons) /ha | Fodder yield (tons) /ha | | | |
| T1 | Control | 75.388 | 78.200 | 73.900 | 75.829 | d | - |
| T2 | Curator 50 WP | 76.375 | 77.750 | 78.490 | 77.538 | c | 2.25 |
| T3 | Topsin-M 70WP | 77.513 | 80.225 | 84.700 | 80.813 | b | 2.98 |
| T4 | Hombre 18.625 FS | 79.400 | 82.425 | 82.750 | 81.525 | ab | 3.94 |
| T5 | Terranil 45DP | 84.125 | 87.800 | 84.750 | 85.558 | a | 11.37 |

LSD=3.375 Note: Means followed by the same letter in a column are not significantly different ($P< 0.05$)

**Table 4. Effect of seed treatments against berseem root rot on monetary returns and C:B**

| Treatment | Fungicides | Mean fodder yield (tons/ha) | Net Income @ Rs.2/kg fodder | Cost of pesticide (Rs./ha) | Incremental return over control (Rs.) | Estimated net benefit (Rs./ha) | CBR |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E(D-C) | F(D/C) |
| T1 | Control | 75.829 | 151658 | - | 0 | | |
| T2 | Curator 50 WP | 77.538 | 155077 | 32 | 3418 | 3386 | 1:105 |
| T3 | Topsin-M 70WP | 80.813 | 161625 | 40 | 9967 | 9927 | 1:249 |
| T4 | Hombre 18.625 FS | 81.525 | 163050 | 134 | 11392 | 11258 | 1:84 |
| T5 | Terranil 45DP | 85.558 | 171117 | 107 | 19351 | 19351 | 1:181 |

## Conclusion

On the basis of above discussion it can be concluded that for the control of berseem root rot disease in berseem fodder crop, the treatment of berseem seed with Topsin-M 70WP can be recommended on the basis of its efficacy in reducing the disease intensity and economic feasibility. It is also suggested that future studies may be based on incorporation of Topsin-M 70WP and Terranil 45DP in soil against this menace in berseem crop.

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