

RECORD ID F 8302
TITLE EFFECT OF FUNGICIDES ON BEAN RUST (UROMYCES APPENDICULATUS (PERS.) LEV)
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JOURNAL MISC. REP. TROP. PEST. RES. INST. 1971. (765): 1-8
DATE NOVEMBER, 1971
LANGUAGE ENGLISH
LOCATION TANZANIA (AFRICA)
PHOTOCOPY NO PC 13467
ABSTRACT PLANTVAX AND TRIFORINE PROVIDED EXCELLENT CONTROL FOLLOWED BY RH-124. HOWEVER, IN CASE OF RH-1224 SOME PHYTOTOXICITY WAS OBSERVED ON ALL PLANTS TREATED. OTHER FUNGICIDES DID NOT PERFORM WELL. FROM LAST YEAR'S TRIAL (HUDSON & JAFFER) AND THIS YEAR IT IS APPARENT THAT APPLICATION OF CONTACT FUNGICIDES TO CONTROL BEAN RUST IS NOT WHOLLY PRACTICABLE DUE TO DIFFICULTIES OF GETTING THE SPRAY TO REACH THE UNDERSIDE OF THE LEAVES. ONLY THE SYSTEMICS WHICH CAN CONTROL THE DISEASE EFFECTIVELY AND CAN BE APPLIED BY AEROPLANES AND MIST BLOWERS WILL FIND GREATER USE HERE CONSIDERING THE LARGE ACREAGE THAT HAVE TO BE SPRAYED AT THE RIGHT TIME.
SOURCE AL MITLEHNER FILES
PRODUCT PLANTVAX
INGREDIENT OXYCARBOXIN
REGISTRY NO 5259-88-1
DOCUMENT TYPE EFFICACY
PHYTOTOXICITY
DTYPE VEGETABLE CROP
CROP BEAN 113303
DISEASE UROMYCES APPENDICULATUS 103018
CLASS 1. (LTN UROMYCES APPENDICULATUS) (ORD UREDINALES) (CLASS BASIDIOMYCETES) (PHYLUM FUNGI) (FLOFAU FLORA)
BIOLOGICAL ACTIVITY FUNG

Effect of fungicides on bean rust (*Uromyces*
appendiculatus (Pers.) Lev)

PC 13467 ✓

By

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Introduction:

In Northern Tanzania growing of beans is one of the major farm practices which brings in considerable amount of foreign exchange to the country. It is estimated that between 20 to 25,000 hectares of beans are grown in Northern Tanzania annually (Ter Veen 1971). Generally, bean plants in Tanzania have been reported to be susceptible to various fungal diseases and are frequently attacked by insects.

Uromyces appendiculatus (Pers.) Lev., a bean rust, causes heavy losses to the crop under climatic conditions suitable to its infection. Planting of varieties which are resistant to rust is one way of reducing the severity of the diseases, but, when the climatic conditions are favourable for the growth of the fungus, the resistance breaks down and some additional chemical control is required if the losses have to be reduced.

In the present trial, systemic as well as non-systemic fungicides were tested for their comparative performance in controlling bean rust, when applied as sprays to the foliage.

Materials and Methods:

Beans, *Phaseolus vulgaris* L. of the highly rust susceptible variety - Dutch Princes No. 200 were planted at the end of March, 1971 in 5 x 6 m. square plots, containing 11 rows of 50 plants each, separated by a $\frac{1}{2}$ m. guard row. A clear strip of $\frac{1}{2}$ m. width was left between the blocks. Plant spacings were 50 cms. by 10 cms.

Five systemic fungicides, namely Plantvax, Triforine, Triarinol(EL 273), RH-124 and Tecto 40 Flowable were compared with four contact fungicides, Duter-Extra, Hoe - 6084, Peracol and Thiovit and untreated control, at the rates mentioned in Table 1.

The treatments were randomized and replicated four times. Fungicides were applied with solo knapsack sprayer when the first symptoms of the disease appeared about a month after planting. A second spray was applied 10 days after the first one.

Table 1:

FUNGICIDES	RATE OF APPLICATION	ACTIVE INGREDIENT	MANUFACTURES
Duter-Extra 48.5% WP.	1.5 Kg/ha	Fentine hydroxide	Murphy Chemicals
Hoe-6084 25% WP.	1.5 Kg/ha	Triphenyltin acetate	Hoechst
Perecol 70% Colloidal	0.3% Solution	Copper oxychloride	Plant Protection Ltd
Thiovit 80% WP.	4. Kg/ha	Sulphur	Sandcz
Plantvax 75% WP.	2.5 Kg a.i./ha	2,3-Dihydro- 5-Carboxanilido- 6-methyl-1,4-oxathiin- 4,4-dioxide	Uni-Royal Chemical
Triforine 20% EC.	0.1% Solution	Piperazin-1,4-diyl-bis -(1-(2,2,2,- trichloroethyl)formide)	Cela-Germany
Triarimol 4% WP.	2.24 Kg/ha	α (2,4-Dichlorophenyl) α phenyl 1-5 pyrimidinmethanol	Elanco Int.
RH-124 80% EC.	675 g/ha	Identity not available	Rohn and Haas
Tecto 40 42.28% Colloidal	150 g/100 litres	Thiabendazole	Merck Sharp and Dohme

The disease was assessed thrice i.e. on the 5th, 12th and 19th day after the second spray, by scoring the rust on 9 leaflets from ten plants per plot. Rating was based on following scale:-

...../3...

- 0 = no rust
- 1 = slightly rusted: 1-5 spots per leaflet of approx. 18 cm²
- 2 = moderately rusted: 6-15 " " " " " " "
- 3 = heavily rusted 15 " " " " " " "
- but 50% of surface still green.
- 4 = 50% of the leaflet rusted
- 5 = no green tissue left.

The yield in kg/plot and post harvest germination percentage of different treatments were also assessed. The latter was assessed by placing 100 seeds in a petri-dish containing a wet filter paper and kept at room temperature for 4 - 6 days after which the germinated seeds were counted on each chemical treatment. This was replicated four times.

Results and Conclusions:

The results of the second assessment of the trial are summarized in Table 2 and Figure 1 and 2.

Table 2 - Disease indices per plot:

TREATMENT	BLOCK I	BLOCK II	BLOCK III	BLOCK IV	TOTAL	MEAN
Duter - Extra	52.60	34.40	66.80	63.20	217.00	54.25 ± 6.56
Hoe - 6084	30.20	27.20	75.60	46.00	179.00	44.75 ± 6.56
Perecol	38.60	46.00	31.80	52.00	168.40	42.10 ± 6.56
Thiovit	43.40	72.00	73.00	64.60	253.00	63.20 ± 6.56
Plantvax	0.40	1.20	0.40	6.00	8.00	2.00 ± 6.56
Triforine	-	8.60	4.00	0.60	13.20	3.30 ± 6.56
Triarimol	22.60	34.20	74.60	50.00	181.40	45.35 ± 6.56
RH - 124	28.60	34.20	32.00	23.20	118.00	29.50 ± 6.56
Tecto 40	73.20	44.00	30.60	76.00	223.80	55.65 ± 6.56
Control	72.80	42.80	74.00	73.40	263.00	65.75 ± 6.56
T o t a l	362.40	344.60	462.80	455.00	1624.80	

Differences between the treatments are significant at $P = 0.05$ and $P = 0.01$. The standard error is 6.56, while the standard error of difference between two treatment means is 10.2. There is no difference between the blocks.

Plantvax and Triforine provided excellent control followed by RH-124. However, in case of RH-124 some phytotoxicity was observed on all plants treated. Other fungicides did not perform well. Figures 1 and 2 show the distribution of frequency of different rust ratings - plants with lower ratings 0 - 1 dominate in case of good fungicides such as Plantvax and Triforine whereas higher rates occur frequently in control and other less effective treatments. The yield figures are summarized in Table 3.

Table 3 - Bean yield figures in kg. per plot

TREATMENT	BLOCK I	BLOCK II	BLOCK III	BLOCK IV	TOTAL	MEAN
Duter-Extra	4.648	6.868	3.361	2.100	16.977	4.244 ± 0.33
Hoe-6084	3.296	5.164	2.719	4.753	15.932	3.983 ± 0.33
Perecol	3.800	1.283	3.491	2.339	10.913	2.728 ± 0.33
Thiovit	4.244	2.251	1.144	3.259	10.898	2.724 ± 0.33
Plantvax	5.021	5.725	5.038	4.300	20.084	5.021 ± 0.33
Triforine	5.221	5.162	5.000	6.101	21.484	5.371 ± 0.33
Triarimol	2.275	5.084	2.200	2.206	11.765	2.941 ± 0.33
RH-124	4.029	1.690	5.983	2.350	14.052	3.513 ± 0.33
Tecto 40	2.650	2.481	2.507	3.207	10.845	2.711 ± 0.33
Control	4.716	1.620	2.707	2.256	11.299	2.824 ± 0.33
T o t a l	39.900	37.328	34.150	32.871	144.249	



Differences between the treatments are significant at $P = 0.05$. The standard error is 0.33 while the standard error of difference between two treatment means is 0.59. There is no difference between the blocks.

The post harvest germination percentage did not show any suppression in germination as shown in Table 4.

Table 4 - Post harvest germination test of bean seeds whose parent plants were sprayed with different fungicides.

TREATMENT	PERCENTAGE GERMINATION OF SEEDS		
Duter-Extra	95	±	1.0
Hoe-6084	97	±	2.1
Perecol	98	±	1.4
Thiovit	97	±	1.0
Plantvax	98	±	2.2
Triforine	99	±	1.0
Triarinol	98	±	2.0
RH - 124	98	±	1.0
Tecto 40	98	±	1.8
Control	98	±	2.3

From our last year's trial (Hudson & Jaffer) and this year it is apparent that application of contact fungicides to control bean rust is not wholly practicable due to difficulties of getting the spray to reach the underside of the leaves. Only the systemics which can control the disease effectively and can be applied by aeroplanes and mist blowers will find greater use here considering the large acerages that have to be sprayed at the right time.

Acknowledgements:

I am grateful to Dr. M.E.A. Materu, the Director and Mr. D.M. Okioga, Plant Pathologist of the Institute for their valuable help and criticism in the preparation of this paper and to Messrs. Burka Coffee Estate Limited for providing the experimental site.

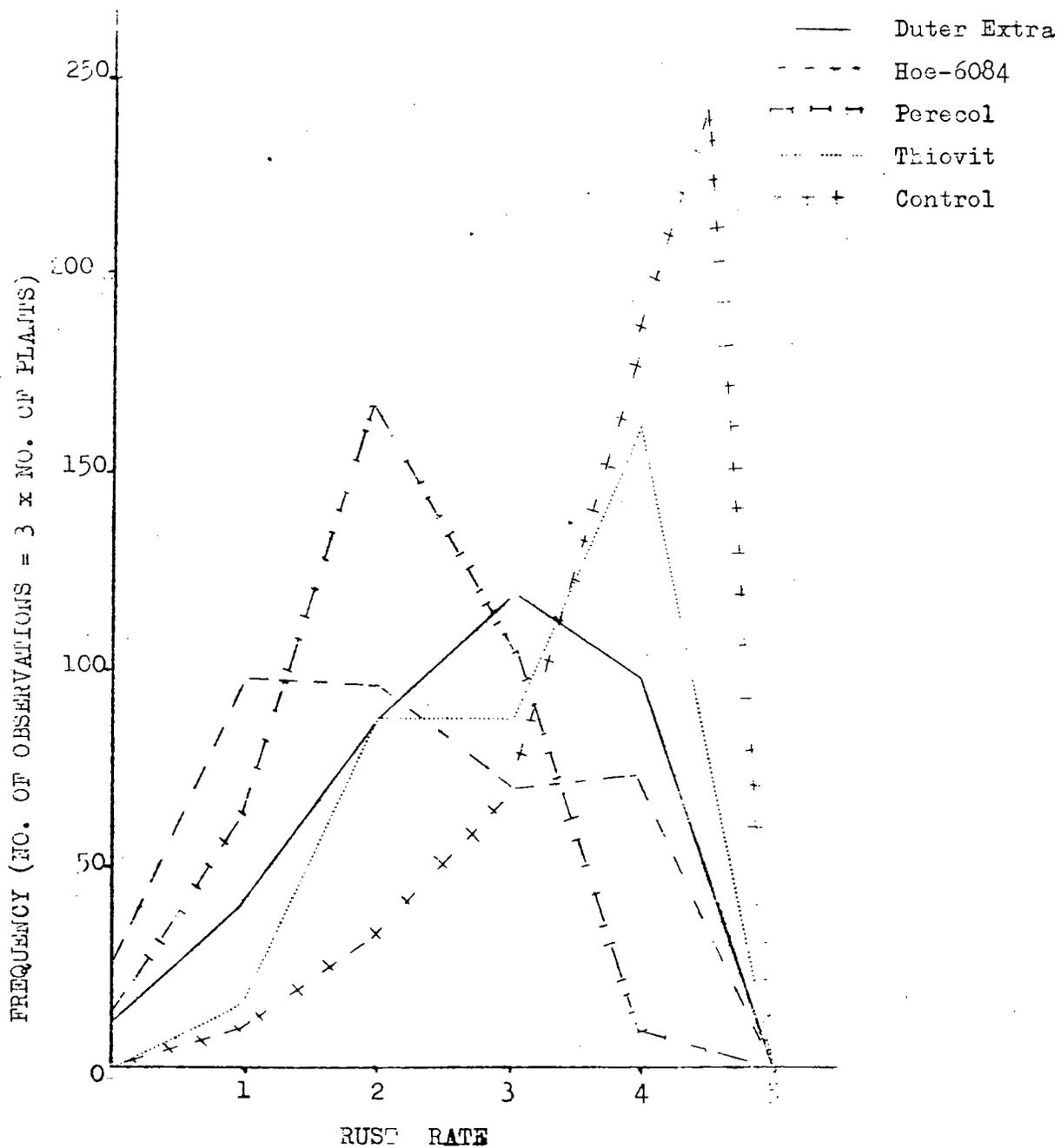
The test compounds were kindly supplied by manufactures listed in Table 1.

References:

Hudson, J. C. and Jaffer, A. A. (1970) Effect of systemic fungicides on bean rust (*Uromyces appendiculatus* (Pers) Lev) T.P.R.I. Misc. Report No. 726.

Ter Veen (1971)

Personal Communication.



TREATMENT/ RUST RATE	0	1	2	3	4	5	TOTAL
Duter-Extra	12	42	88	119	99	(?)	360
Hoe-6084	20	96	96	73	75	-	360
Perecol	11	63	170	107	9	-	360
Thiovit	-	15	88	89	159	9	360
Plantvax	323	37	-	-	-	-	360
Eriforine	300	60	-	-	-	-	360
Triarimol	1	50	157	74	78	-	360
RH-124	12	103	196	49	-	-	360
Tecto 40	12	56	57	102	130	3	360
Control	1	11	31	69	245	3	360

FIGURE 2 - DISTRIBUTION OF RUST RATE FREQUENCIES

