

**TAGRO – Tecnologia Agropecuária Ltda.**

EFFICIENCY OF COPPER METALOSATE ON CONTROL OF ASIAN RUST ON SOYBEAN

PROTOCOL COPPER METALOSATE - 2015/16 VINTAGE

Requestor: ARYSTA LIFESCIENCE OF BRAZIL IND. CHEMISTRY AND AGROPEC. LTDA.

..

Av. Presidente Juscelino Kubitschek, Nº 2.041, 12º floor,
Block E, Condomínio W, Torre JK - Vila Nova Conceição
E-mail: walmor.roim@arysta.com
Fone: (11) 3054-5000
04.543-011 - São Paulo - P

Executor: TAGRO – Tecnologia Agropecuária Ltda.
Street Guilherme da Mota Correia, 4593 - Jd. Shangri-lá
E-mail: tagro@tagro.com.br
Fone/Fax: (43) 3348-4712
86.070-460 - Londrina - PR

AUGUST 2016

GOAL

Evaluate the efficiency of Copper Metalosate, associated with the other mixtures of fungicides, front the other guards, in the control of Asian rust, on the culture soybeans.

MATERIALS AND METHODS

- **Location** : Octavio Farm, Faxinal, PR.
- **Cultivate** : On 5909 RG
- **Date of sowing**: 09/12/2015
- **System of cultivation**: direct seeding
- **Delineation**: blocks the chance with 5 repetitions.
- **Size of Parcels**: 14.00 m² (4 lines x 7 m - spacing of 0.5 m), with 5 m² of useful area.
- **Technology of application**: costal equipment the basis of CO₂, equipped with nozzles double range AD 110.02, pressure of work of 30 lb/in² and flow of 150 L/ha.

- **Conditions of application**:

CARACTERÍSTICAS	1ª Application	2ª Application	3ª Application
Date	26/01/2016	18/02/2016	02/03/2016
Severity Rust (Test.)	0,01% (1ºs sint.)	30%	85 %
Phenolological Stage	R1	R4	R5.3
Environment Temperature	26,5 °C	24,5 °C	26 °C
Relative Humidity (%)	80 %	92 %	76 %
Application time	11:50 - 12:30	10:50 - 11:20	15:30 - 16:05
Cloudiness (%)	50 %	50 %	40 %
Speed of the wind	2 km/h	3 km/h	3 km/h

- **Reviews**: Percentage of foliar area affected by rust, phytotoxicity, percentage defoliation (witness with 92%), cycle stand end, yield and weight of thousand grains.
- **Analyses statistics**: The results obtained were subjected to analysis of variance and

the medium separated by test of Tukey to 5% of significance, by the statistical programmer SASM-Agri (Canteri *et al.*, 2001).

- **Harvest:** 31/03/2016.

TABLE 1. Treatment of the test of control of Rust on Asian culture of soybean (cv. On 5909 RG). TAGRO. Faxinal, PR Vintage 2015/16.

TREATMENTS	RATES (g or ml)	
	g i.a./ha	p.c./ha
1. WITNESS	0	0
2. DOMARK XL	60 + 48	600
3. DOMARK XL + DIFERE	60 + 48 + 294	600 + 500
4. DOMARK XL + COPPER METALOSATE	60 + 48 + 13,56	600 + 300
5. DOMARK XL + COPPER METALOSATE	60 + 48 + 22,6	600 + 500
6. DOMARK XL + COPPER METALOSATE	60 + 48 + 31,64	600 + 700
7. DOMARK XL + COPPER METALOSATE	60 + 48 + 45,2	600 + 1000
8. DOMARK XL + COPPER METALOSATE	60 + 48 + 67,8	600 + 1500
9. DOMARK XL + UNIZEB GLORY	60 + 48 + 75 + 1050	600 + 1500
10. PRIORI + ALTO 100 + DIFERE	66 + 24 + 294	264 + 240 + 500
11. PRIORI + ALTO 100 + COPPER METALOSATE	66 + 24 + 13,56	264 + 240 + 300
12. PRIORI + ALTO 100 + COPPER METALOSATE	66 + 24 + 22,6	264 + 240 + 500
13. COPPER METALOSATE + DIFERE	22,6 + 294	500 + 500

¹/g a.i./ha: grams of ingredient Active for hectare.

²/p.c.:/ha grams or milliliters of product commercial for hectare.

The climatic data of Faxinal, PR, in the period of December of 2015 the 10 of April to 2016, was presented in Figure 1. (Source: SOMAR).

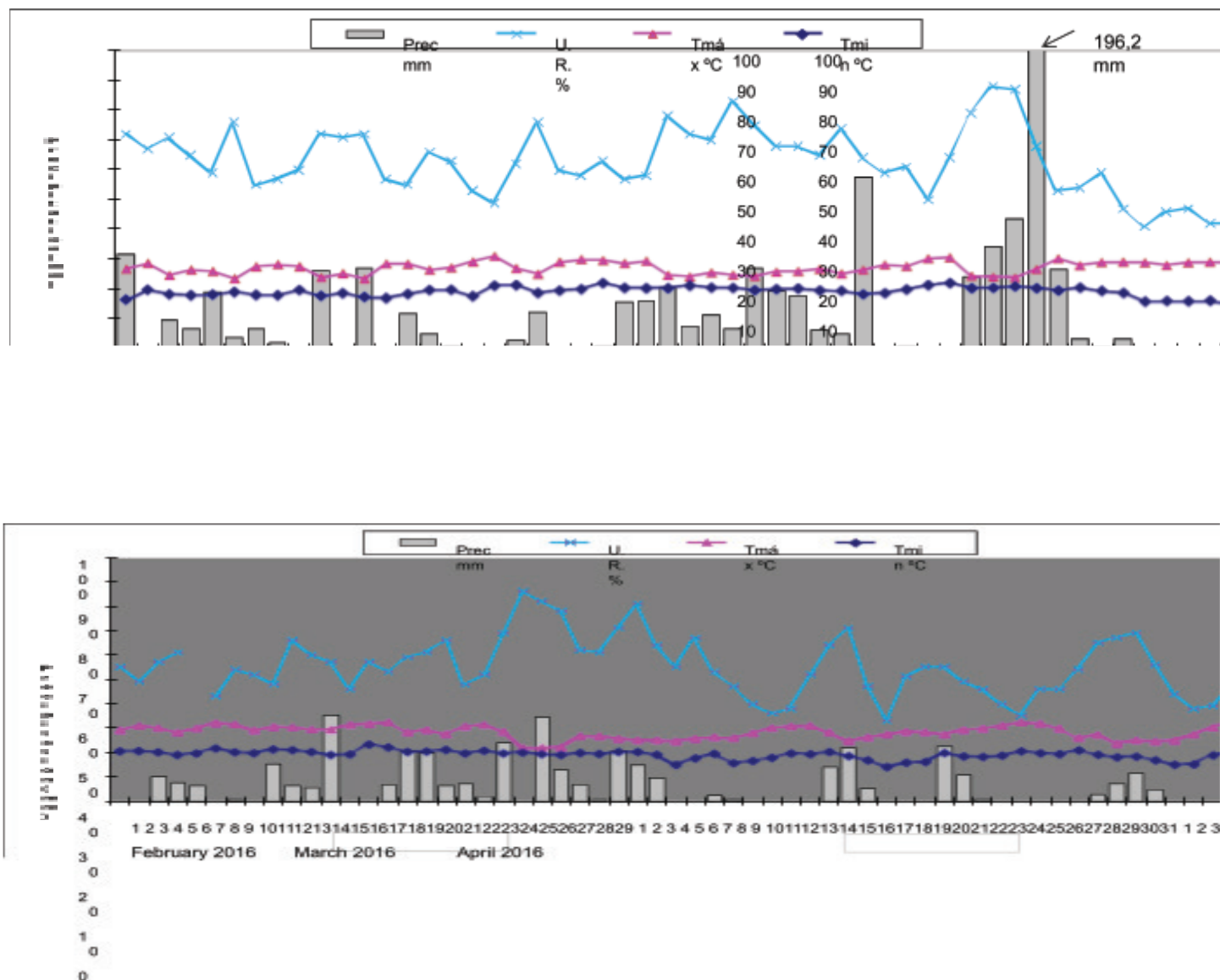


Figure 1. Climatic Data of December of 2015 the 10 of April of 2016. Faxinal - PR. source: SOMAR.

RESULTS

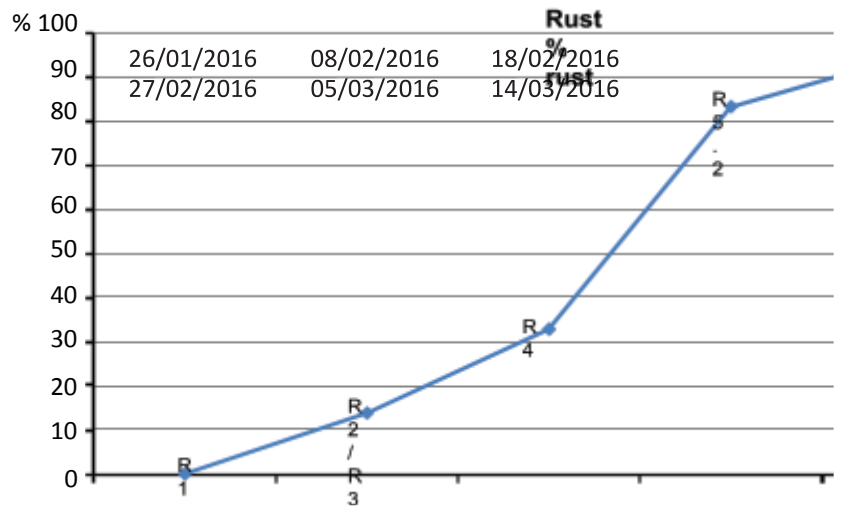


FIGURE 2. Effect of application of fungicides in the evolution of the infection of rust on culture of soybean (CV. on 5909 RG). TAGRO. Faxinal, Pastor Vintage 2015/16.

(A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
)



FIGURE 3. Effect of application of fungicides on the area below the curve of progress of rust as measured by AACPD on soybean (CV. on 5909 RG). TAGRO. Faxinal, PR - Vintage 2015/16.

(A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
)

TABLE 2. Effect of application of fungicides on the severity of rust and the area Below the Curve of the progress of the Disease (AACPD) of Rust on culture of soy (CV. on 5909 RG). TAGRO. Faxinal, PR - Vintage 2015/16.

TREATMENTS (%) ^{1/}	SEVERITY OF RUST AACPD					
		Products	Doses g or mL p.c./ha	08/02/16 R2/R3	18/02/16 * R4	27/02/16 R5.2
1. WITNESS		0	13,80 (0) a	32,80 (0) a	83,20 (0) a	95,00 (0) a
2. DOMARK XL		600	6,40 (54) b	19,60 (40) bcd	70,00 (16) b	89,00 (6) b
3. DOMARK XL + DIFERE		600 + 500	7,10 (49) b	19,00 (42) bcd	62,20 (25) bcde	81,00 (15) d
4. DOMARK XL + COPPER METALOSATE		600 + 300	7,00 (49) b	20,80 (37) bc	71,00 (15) b	88,60 (7) b
5. DOMARK XL + COPPERE METALOSATE		600 + 500	7,70 (44) b	21,00 (36) bc	68,40 (18) bcd	87,80 (8) bc
6. DOMARK XL + COPPER METALOSATE		600 + 700	6,90 (50) b	19,80 (40) bcd	70,00 (16) b	86,00 (9) bc
7. DOMARK XL + COPPER METALOSATE		600 + 1000	6,80 (51) b	19,00 (42) bcd	66,00 (21) bcde	83,60 (12) cd
8. DOMARK XL + COPPER METALOSATE		600 + 1500	7,30 (47) b	20,20 (38) bc	68,60 (18) bc	85,40 (10) bcd
9. DOMARK XL + UNIZEB GLORY		600 + 1500	6,00 (57) b	16,00 (51) cd	58,00 (30) de	75,00 (21) e
10. PRIORI + ALTO 100 + DIFERE		264 + 240 + 500	5,50 (60) b	15,00 (54) d	56,00 (33) e	75,40 (21) e
11. PRIORI + ALTO 100 + COPPER METALOSATE		264 + 240 + 300	6,50 (53) b	18,20 (45) bcd	62,00 (25) bcde	86,40 (9) bc
12. PRIORI + ALTO 100 + COPPER METALOSATE		264 + 240 + 500	5,90 (57) b	17,20 (48) cd	59,00 (29) cde	85,40 (10) bcd
13. COPPER METALOSATE + DIFERE		500 + 500	7,60 (45) b	23,00 (30) b	71,40 (14) b	83,80 (12) cd
C.V. (%)			8,28 ^{2/}	6,59 ^{2/}	5,18 ^{2/}	2,53 ^{2/}

^{1/} Average of five repetitions per treatment. Values between parentheses represent the efficiency of control, in relation to witness. Values followed by the same letter does not differ between themselves by Test Tukey to 5% of probability.

^{2/} For realization of the analysis of variance (ANOVA), the original data were transformed to arc sen

$x/100$.

^{3/} For realization of the analysis of variance (ANOVA), the original data is not have been transformed.



***It was made an evaluation on the day 18/02/16 (R4), but in function of rain, was not possible to evaluate all the rehearsal. (Made in three repetitions).**

TABLE 3. Effect of application of fungicides on the Phytotoxicity, Percentage of Defoliation, Cycle of culture, Stand End, Yield of grains and Weight of Thousand grains, in the culture of soybean (CV. on 5909 RG). TAGRO. Faxinal, PR. Vintage 2015/16.

TREATMENTS FITOTOXI	DEFOLIATION (%) Stand end	CYCLE C I T Y	YIELD	W E I G H T 1 0 0 0 G R A I N S	
(%)					
Products Doses g ou mL p.c./ha	R6 linear	(Days) (Kg/ha)	(PL/meter Diference (Kg/ha)	(g)	
1. WITNESS		0	0,00	92,80 (0) a	97,80 (0) c
11,14 (0) a		888,47 (0) f	0,00	104,82 (0) b	
2. DOMARK XL		600	0,00	83,00 (11) ab	98,20 (0) bc
10,16 (-9) a		949,30 (7) ef	60,83	107,56 (3) ab	
3. DOMARK XL + DIFERE		600 + 500	0,00	76,00 (18) bc	98,80 (1) ab
10,92 (-2) a		1.183,20 (33) bcd	294,72	108,56 (4) ab	
4. DOMARK XL + COPPER METALOSATE		600 + 300	0,00	84,60 (9) ab	98,00 (0) bc
10,58 (-5) a		1.000,68 (13) def	112,21	106,48 (2) ab	
5. DOMARK XL + COPPER METALOSATE		600 + 500	0,00	84,60 (9) ab	98,40 (1) bc
10,96 (-2) a		1.035,26 (17) cdef	146,79	107,90 (3) ab	
6. DOMARK XL + COPPER METALOSATE		600 + 700	0,10	84,80 (9) ab	98,40 (1) bc
10,64 (-4) a		1.006,03 (13) cdef	117,56	107,01 (2) ab	
7. DOMARK XL + COPPER METALOSATE		600 + 1000	0,90	85,60 (8) ab	98,20 (0) bc
10,76 (-3) a		1.064,31 (20) cdef	175,83	108,14 (3) ab	
8. DOMARK XL + COPPER METALOSATE		600 + 1500	2,10	77,20 (17) bc	98,40 (1) bc
11,02 (-1) a		1.137,17 (28) cdef	248,70	107,68 (3) ab	
9. DOMARK XL + UNIZEB GLORY		600 + 1500	0,00	65,20 (30) d	99,60 (2) a
10,94 (-2) a		1.462,70 (65) a	574,23	110,10 (5) a	
10. PRIORI + ALTO 100 + DIFERE		264 + 240 + 500	0,00	67,40 (27) cd	99,40 (2) a
10,08 (-10) a		1.387,43 (56) ab	498,95	108,38 (3) ab	

11. PRIORI + ALTO 100 + COPPER METALOSATE	264 + 240 + 300	0,90	84,80 (9) ab	98,20 (0) bc
10,64 (-4) a	1.016,35 (14) cdef	127,88	107,40 (2) ab	
12. PRIORI + ALTO 100 + COPPER METALOSATE	264 + 240 + 500	1,80	82,20 (11) b	98,40 (1) bc
10,50 (-6) a	1.108,10 (25) cde	219,63	107,82 (3) ab	
13. COPPER METALOSATE + DIFERE	500 + 500	1,80	77,40 (17) bc	98,40 (1) bc
10,86 (-3) a	1.222,23 (38) bc	333,76	106,75 (2) b	
C.V. (%)			5,95 ^{2/}	0,46 ^{3/}
5,57 ^{3/}			8,86 ^{3/}	1,44 ^{3/}

^{1/} Average of five repetitions per treatment. Values between parentheses represent the efficiency of control, in relation to witness.
 Values followed by the same letter does not differ between themselves by Test Tukey to 5% of probability.



^{2/} For realization of the analysis of variance (ANOVA), the original data were transformed to arc sen

^{3/} For realization of the analysis of variance (ANOVA), the original data is not have been transformed.

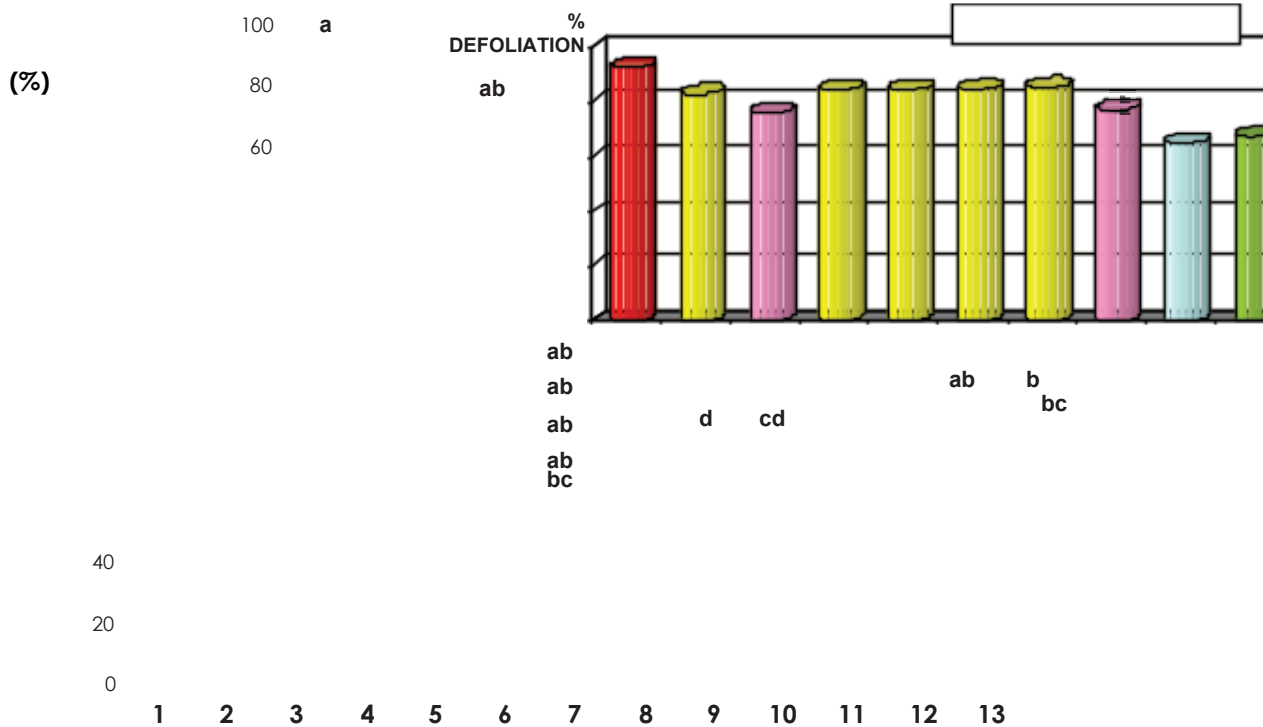


FIGURE 4. Effect of application of fungicides on the defoliation of plants in culture the soybeans (cv. 5909 on RG). TAGRO. Faxinal, PR - Vintage 2015/16

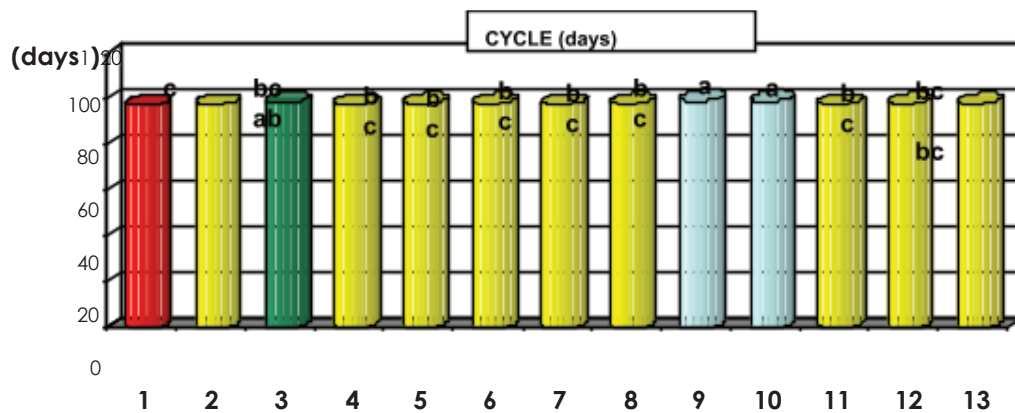


FIGURE 5. Effect of application of fungicides on the cycle in the culture of soybeans (CV. on 5909 RG). TAGRO. Faxinal, PR - Vintage 2015/16.

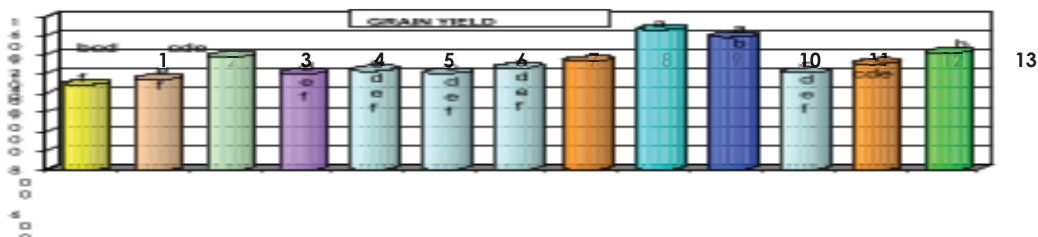
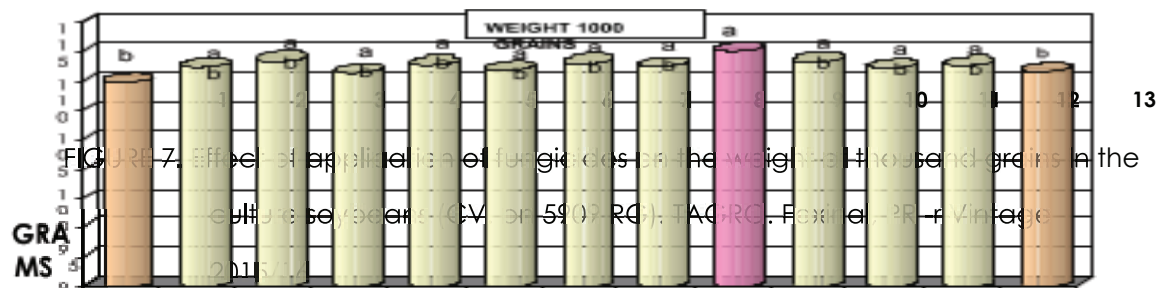


FIGURE 6. Effect of application of fungicides on the yield of grain in culture of soybean (cv. On 5909 RG). TAGRO. Faxinal, PR - Vintage 2015/16.



CONSIDERATIONS

The results obtained in the experiment allow us to conclude that:

- The conditions favorable weather and the late planting of soybean have provided a high infection of Asian rust in the experiment;
- All the treatments tested significantly reduced the infection of Asian rust, slowing the defoliation of plants, prolonging the cycle of culture and reducing the losses in yield and weight of thousand grains;
- Treatments that received applications of Domark XL + Unizeb Glory and Priorities + Top 100 + Differs were those that showed the best results in the control of Asian rust, minor defoliation, larger yield of grain and greater weight of thousand grains;
- The Association of Copper metalosate, in different doses, the Domark XL and the Priori + Top 100, not provided significant gains in efficiency of control of rust, the opposite of Differs and Unizeb Glory;
- No was observed effect of dose to Copper Metalosate;
- The treatments with greater doses of Copper metalosate (700, 1000 and 1500) associated the Domark XL and the treatments with Copper metalosate associated the Priori + Top 100 and Covers metalosate + Differs presented symptoms of phytotoxicity on the limbo foliar on culture of soybean characterized by small white spots;

REFERÊNCIAS BIBLIOGRÁFICAS:

AGROFIT: sistema de agrotóxicos fitossanitários. Disponível em: http://extranet.agricultura.gov.br/agrofit_cons/principal_agrofit_cons. Acesso em: 15 de junho de 2015.

CANTERI, M.G.; ALTHAUS, R.A.; VIRGENS FILHO, J.S.; GIGLIOTI, E.A.; GODOY, C.V. **SASM-Agri: Sistema para análise e separação de médias em experimentos agrícolas pelos métodos Scott-Knott, Tukey e Duncan.** Revista Brasileira de Agrocomputação, V.1, N.2, p.18-24, 2001.

Londrina, PR, 10 de Agosto de 2016.



LUIZ NOBUO SATO

Eng. Agr. – Responsável pelo campo
CREA-PR 13.122-D



CARLOS MITINORI UTIAMADA

Eng. Agr. - Gerente Técnico
CREA-PR 18.609-D