Effect of different Land Preparations on Soil Microorganism Population and Seed Treatments with Fungicides on Bean Production in No till farming

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Management of large quantity of crop residues on the soil surface in no till farming is very important. Thung et al., 1998 and Thung 1997 have shown that different sources of mulch and weed eradication methods influenced the bean yield. This organic matter can be the host of many non-pathogenic and pathogenic microorganism. Observations indicated a higher number of microorganism propagules in the soil in no till farming than those in conventional farming. Among the pathogenic microorganisms, *Rhizoctonia solani* and *Fusarium solani* are the most important in bean production, because it reduce not only the plant population and development of the plant, but also the yield.

The elimination of crop residues through deep incorporation is recommended in traditional bean production system, as a mean to reduce soil borne diseases e.g., white mold, web blight, ashy stem blight, Rhizoctonia and Fusarium root rot (Cardoso et al. 1996, Costa e Silveira, 1997). The dynamic of soil borne diseases either in traditional or in no-till farming is not well understood. It was postulated that soil borne diseases increase when the equilibrium of the microorganism in the soil is disturbed. Preliminary data from farm practicing no till farming for more than 13 years, showed that deep plowing with moldboard plow reduced temporarily up to 50% the *R. solani*, *F. solani* and bacterial population. It can be assumed that decrease in pathogenic microorganisms reduce the probability of infection by soil borne diseases (Table 1). One year later, after rice and beans rotation the same field was accessed. It was observed that the pathogenic microorganism had reestablished, but in no till planting system pathogenic fungi were lower than in plots plowed with moldboard plow. On the other hand the total soil population of fungi and bacteria were higher in no till plots. This result indicated that non-pathogenic microorganisms increased recovering the equilibrium of the soil microorganisms.

An experiment with four seed treatments were conducted on five different crop residues (soybean, maize, rice, maize + *B. brizantha* and maize + *B. ruzizienzis*) was conducted at Santa Fe farm in Santa Helena/GO with the objective to evaluate the efficacy of seed treatments. Seed treatments were as followed: 1) check plot (without seed treatment), 2) 150 g Carbendazin, 3) 100 g Benomyl + 150 g Thiram, and 4) 200 g Carboxin + 150 g Thiram. Dosages are of commercial product/100 kg of cv Perola bean seed, aprostrate type III. Split plot design was applied for the experiment where the main plot was for the 5 crop residues and the subplots were the seed treatment combinations, with 4 repetitions. The row spacing was 0,45 m and the planting density was 15 seeds m^{-1}. The result is summarized in Table 3. The highest plan density was obtained from plots with soybean or rice residues and differed significantly to the other three crop residues. Even with low density bean yield was not affected because of the compensatory effect of the type III cv Perola. The highest yield was obtained from plot with residues of maize+*B. ruziziensis*, followed by plot with rice residue. Although high pod number per plant was obtained from plots with maize + *B. brizantha* bean yield in this treatment was significantly reduced due to the low plant density. The lowest plant density and yield was observed from plots with Carbendazin treatment, indicating that the seed treatment with this fungicide has poor effect. The high pod number per plant did not compensate yield loss. It is too early to draw any conclusion from this experiment and it is suggested to continue with the experiment in the next season.

References:

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[1] Supported by CNPq fellowship

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TABLE 1. Number of pathogenic propagules and total fungal and bacterial populations taken from two different land preparation methods before the rice planting at Santa Fe Farm in Santa Helena de Goiás/GO.

Land preparation method	*R. solani*	*F. solani*	Total fungi population	Total bacteria population
	Propagules/g of soil			
NT *	88.7 a	5205 a **	35147×10^2 a **	45070×10^2 a **
MB	45.0 b	2235 b	22218×10^2 b	36197×10^2 b
CV(%)	18	54	32	142

* NT = no till system, MB = moldboard plow. ** Means follow by the same letter in the same column are not significantly different by Tukey test at 5% probability level.

TABLE 2. Number of pathogenic propagules and total fungal and bacterial population taken one year later from two different land preparation methods taken one year after the first sampling at Santa Fe Farm in Santa Helena de Goiás/GO.

Land preparation method	*R. solani*	*F. solani*	Total fungi population	Total bacteria population
	Propagules/g of soil			
NT *	3995	47.3 b**	46925×10^2 a**	89575×10^2 a**
MB	4025	58.3 ab	33325×10^2 b	48275×10^2 b
CV(%)	7	19	15	10

* NT = no till system and MB = moldboard plow. ** Means follow by the same letter in the same column are not significantly different by Tukey test at 5% probability level.

TABLE 3 Effect of seed treatment with fungicide and five source of mulch on the bean yield at Santa Fe Farm in Santa Helena de Goiás/GO.

Treatment	Plant density. (1000 plant ha^{-1})	Pod $plant^{-1}$	Yield (kg ha^{-1})
Crop residues:			
Soybean	279997 a**	12.7 ab**	3322 c**
Rice	273997 a	11.7 b	3687 b
Maize	238664 b	12.0 b	3358 c
Maize + *Brachiaria brizantha*	227331 b	14.4 ab	3270 c
Maize + *Brachiarria ruziziensis*	213998 b	15.4 a	4010 a
Seed treatment:*			
Check	252442 a**	12.9 ab**	3664 a**
Carbendazin (150 g)	211553 b	15.1 a	3025 b
Benomyl (100 g) + Thiram (150 g)	254442 a	11.9 b	3750 a
Carboxin (200 g)+ Thiram (150)	268664 a	13.1 ab	3677 a
CV (%)	12	27	7

* Gram of commercial product/100 kg seed. ** Means followed by the same letter, in column, do not differ from each other at 5% Tukey.