# Bean production and white mould incidence under no-till system

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White mould has become an important disease in irrigated winter bean production in no-till farming system. In this irrigated area the soil never had sufficient time to dry out, which normally take place during dry winter period. The no till farming has become a standard cultural practice to stabilized the bean productivity in the Savannah region (Balbino et al., 1997). About 300,000 hectare of irrigated land is available in the Brazilian Savannah for winter bean production. With a sufficient soil cover the water use efficiency increased about 30% in this irrigated cropping system (Stone and Moreira, 1995). Due to high mineralization process in the tropics, the crop residues as cover crop do not last to protect the entire cycle of the subsequent annual crop. Seguy et al. (1992) showed that 90 days after harvest in non irrigated areas the soil cover by residues of maize, rice, and soybean remained only 63, 65, and 86%, respectively. The high soil humidity and organic matter content favor the proliferation of the white mould. It was observed that previous crops residue affect the incidence of white mould in beans. Seed treatment only can not control satisfactorily the white mould disease and resistant cultivars are not available, because reliable resistant parents are still to be identified. Growing cover crops for mulching is impractical in intensive agriculture system, due to time availability. Mulching utilizing previous crop residues is at the moment the best option to reduce the white mould incidence. Planting fodder grass between maize rows is being developed as an innovative method to integrate agriculture production system and cattle husbandry in the Brazilian Savannah. The *Brachiaria* seed was mixed with the fertilizers and drilled below the maize seeds and between the maize rows another row of *Brachiaria* was planted. With this planting pattern, a rapid and uniform *Brachiaria* stand can be obtained without reducing the maize yield. During the maize growth cycle, the grasses growth were slow because of the shading by the maize plant. Once the maize was harvested, the *Brachiaria* has a rapid growth. This unique planting pattern is also recommended to ameliorate the degraded pasture at minimum cost. The maize output will recover the cost of the pasture renovation.

An experiment was conducted to evaluate the effect of different crop residues on bean production and the white mould incidence at Santa Fe farm in Santa Helana-GO (17° 48' 49'' South and 50° 35' 49'' West, at 615 m a.s.l.) in the winter 1999 with irrigation in no-till system. The five previous summer crops (soybean, maize, upland rice and the maize intercropped with the *B. brizantha and B. ruziziensis*) were harvested between March and April 1999. The residues of these annual crops were assessed before planting and after the harvest, by taking sample of 1 $m^2$ in 4 repetitions. All plots received systemic herbicide to facilitate the bean planting and also to reduced the weed. Basal fertilization was given at the rate of 200kg $ha^{-1}$ of complete fertilizer type 5: 25:25 and 150 kg $ha^{-1}$ urea was side dressed three weeks after emergence. The experimental design was split plot in 5 repetitions. The main plot was the crop residues and the subplot was planted with bean cv. Pérola, a prostrate growth habit, and between rows spacing was 0,45 m and plant density of 15 seeds $m^{-1}$.

There was no significant effect of different residues on bean yield and yield component (Table 1), but the tendency of higher yield was observed from plots with rice residue and maize intercropped with both *Brachiaria*. The highest yield was obtained from plots with maize and *B ruziziensis*. Germination and final plant population was reduced in plots where *Brachiaria* was planted. Maize intercropped with both *Brachiaria* produced a high quantity of death mulch (killed by the systemic herbicides), impeding the normal germination of the beans. Bean emergence was weak and plants were etiolated. The plants recovered after the third trifolate stage, but the population was lower than

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those in plots with the monoculture crop residues. The lower plant population was compensated by the prostrate cv. Perola through extending its growth cycle, hence gave more time to the pod filling stage and higher yield. The *Brachiaria* cover proved to be the best protection against the white mould incidence.

Both *Brachiaria* species intercropped with maize and maize in monoculture produced the highest biomass (Table 2). In the period of 3 months the quantity of the biomass of the residue from previous crop was reduced 60, 40, 30, 45 and 47%, for soybean, maize, rice, maize intercropped with *B. brizantha,* and maize intercropped with *B. ruziziensis*, respectively.

Further studies is still needed to understand better the action of *Brachiaria* and its efficacy in protecting the bean against the white mould incidence. The intercropping maize and grasses such as *Brachiaria* is an innovative cultural practice in bean production for the Savannah regions, because it does not reduce the maize yield, neither does it need an extra time that would be required to plant the traditional cover crops.

TABLE 1. Effect of different residues of previous crops on bean yield and yield component and white mold incidence at Santa Fe farm in Santa Helena de Goias-GO.

| Source of residue | Initial pop. (1000 pl ha$^{-1}$) | Final pop. (1000 pl ha$^{-1}$) | Pods plant$^{-1}$ | Seeds pod$^{-1}$ | Yield (kg ha$^{-1}$) | White mould incidence* |
|---|---|---|---|---|---|---|
| Soybean | 300.0 a** | 315.8 a | 12.89 | 5.72 | 3606 | 5 |
| Maize | 297.3 a | 247.2 b | 13.56 | 6.26 | 3577 | 5 |
| Rice | 297.3 a | 294.1a | 11.10 | 5.49 | 3787 | 3 |
| Maize +*B. brizantha* | 250.0 ab | 215.5 b | 15.90 | 5.97 | 3641 | 1 |
| Maize + *B. ruzizienzis* | 225.1 b | 209.4 b | 11.26 | 5.43 | 3899 | 1 |
| CV (%) | 13 | 11 | 30 | 11 | 10 | |

*Scoring 1 to 9, where 1 no symptom was observed and 9 was 100% infested (Schoonhoven and Pastor-Corrales, 1984). ** The plant populations in soybean were incorrect due to sampling problem, and means followed by the same letter in the same column are not significantly different by Tukey test at P=0.05.

Table 2. Residue of different previous crops taken prior to planting and at harvest.

| Source of residue | Dry matter (t ha$^{-1}$) | |
|---|---|---|
| | Before planting | Before harvest |
| Soybean | 4.06 c * | 1.62 c* |
| Maize | 10.49 bc | 6.30 ab |
| Rice | 6.02 c | 4.22 bc |
| Maize + *B. brizanta* | 16.02 ab | 8.81 a |
| Maize + *B. ruzizienzis* | 17.58 a | 9.27 a |
| CV (%) | 28 | 25 |

* Means followed by the same letter in the same column are not significantly different by Tukey test at P=0.05.

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