

APPENDIX

Item 1 – Additional Information about the Suitability of Sunflower Cultivation in Double Cropping Systems in MT

The state of Mato Grosso (MT) is located in Midwestern Brazil and leads the national production of soybean, maize, cotton, and sunflower. In this state, farmers have increasingly adopted double cropping systems, in which more than one crop is cultivated in the same area in one agricultural year, resulting in two growing seasons per year. The first one begins in October with the onset of the rainy season, having soybean as the main crop. The second growing season, in turn, lasts from January until September, including the cultivation of maize, cotton, and sunflower in succession to soybean (Table 1). The main double cropping scheme observed in MT is soybean-maize, while the soybean-sunflower system is mostly observed in the western region.

Table 1. Agricultural calendar in the state of Mato Grosso.

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Soybean | S | | | H | | | | | | | | |
| Maize | | | | | S | | | | | H | | |
| Cotton | | | | S | | | | | | | H | |
| Sunflower | | | | | S | | | | | H | | |

S = Sowing, H = Harvest

The cultivation of sunflower in succession to soybean might enhance the risk of infection with the fungus *Sclerotinia sclerotiorum* (white mold), a pathogen common to both crops. Nevertheless, the occurrence of *Sclerotinia* in sunflower fields is mainly observed under conditions of low temperature and high moisture by the end of the production cycle [1], which typically does not characterize the sunflower growing season in MT (Feb/Mar–Jun/Jul). Thus, sunflower avoids the excessive moisture observed in the first crop season (Oct/Jan), but, at the same time, the crop benefits from the late rainfalls (Apr/May) necessary for the flowering and achene development. Despite the lower risk of *Sclerotinia* infection in MT in comparison with other regions, disease management systems are recommended for sunflower growers in MT not only to prevent or control this pathogen, but also other diseases affecting sunflower cultivation (e.g., *Alternaria helianthi*, *Septoria helianthi*) [1,2]. In this regard, the main aspects of a disease management control are the choice of most appropriate sowing date, quality and origin of cultivars, plant population (density), soil and plant nutrition, chemical control of diseases, and yearly alternation (or rotation) of area with other crops, which contributes to avoid soil fatigue problems. Furthermore, the higher tolerance to water shortage of sunflower in comparison with maize leads most of the sunflower growers in MT to sow sunflower only after the sowing of maize. Thus, farmers usually allocate smaller land shares for sunflower, facilitating the yearly rotation of area.

Item 2 – Additional Information about the Reference Farmer

Prior to this chain initiative, some farmers in that region produced sunflower in the 1990s for a food industry located 1300 km away from Campo Novo do Parecis. However, difficulties in growing and commercializing sunflower have led most farmers to stop producing this crop, except for one of them (the reference farmer), who continued to produce sunflower over the years, operating in the bird

feed market. Thus, although some other farmers in the group had already grown sunflower, the reference farmer was the one with the most experience. Moreover, he enjoyed the respect and admiration of other farmers due to a positive social and business reputation and, besides possessing leadership skills, was also recognized by the other group members. Thus, the reference farmer was the leading propagator of the feasibility and benefits of sunflower and functioned as the focal point of sunflower knowledge diffusion in the group.

References

1. Castro, C.; Leite, R. M. V. B. C. Main aspects of sunflower production in Brazil. *OCL* **2018**, 25, D:104, doi:<https://doi.org/10.1051/ocl/2017056>.
2. *Girassol no Brasil*; Leite, R. M. V. B. de C., Brighenti, A. M., Castro, C. de, Eds.; Embrapa Soja: Londrina, 2005; ISBN 85-7033-005-7.