History and opportunities of partnership between Embrapa Soja and CABI - Brazil

Embrapa Soja

CABI

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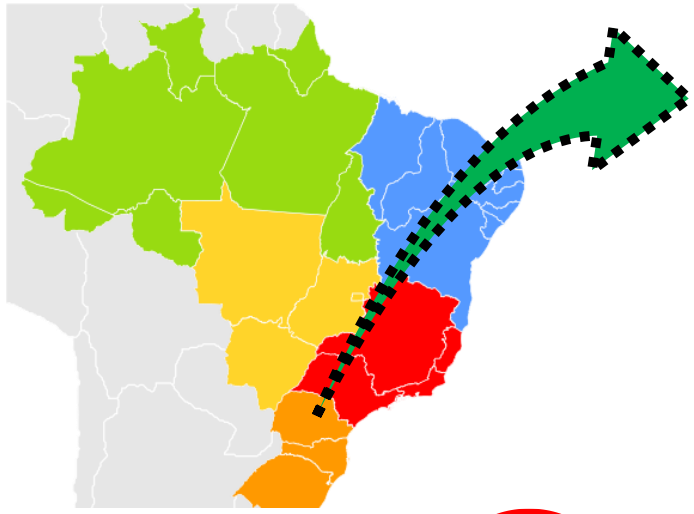
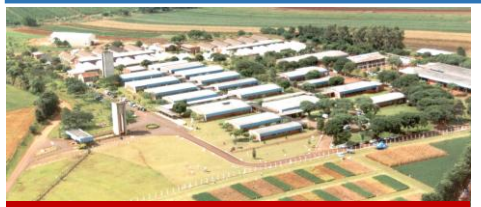


- Embrapa Soybean is one of 43 Embrapa`s research units
- Located in the State of Paraná (Southern Brazil)



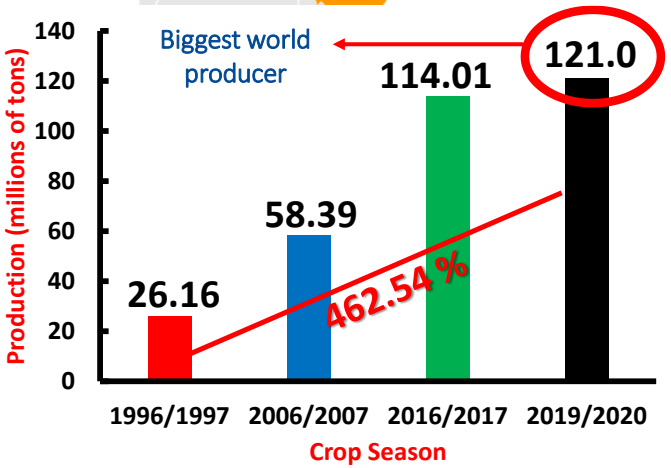
Construction area: 37,221 m²

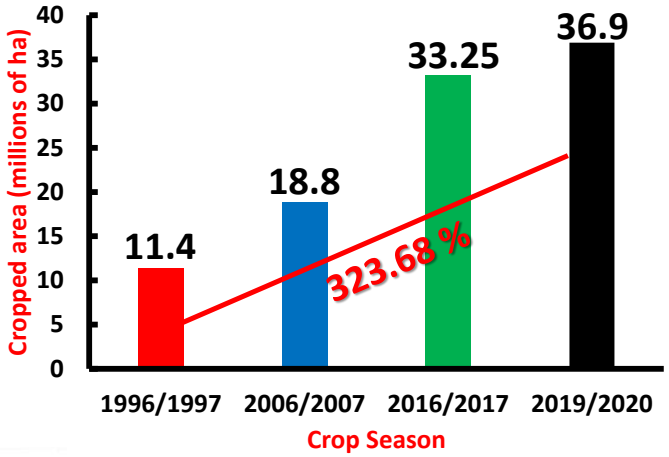
350-ha Farm

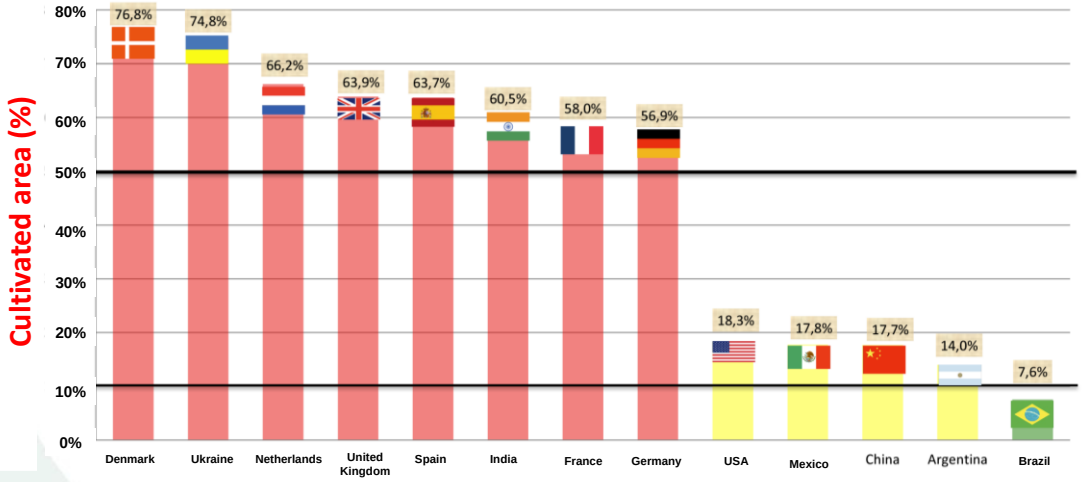
270 Workers

62 Scientists

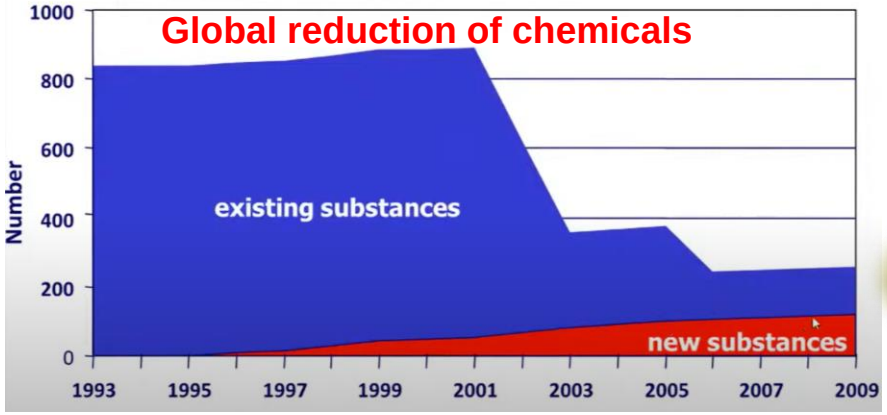
75 Masters and PhD students







Available : Global Cropland (2019). Available at : https://croplands.org/app/map/statsMap
Global Food Security Analysis-Support Data at 30 Meters (GFSAD30) Project



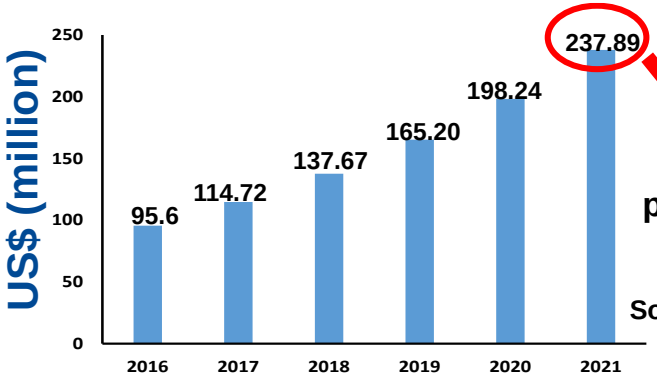
Source: European Commission

Great demand for biological control

Macrobiologicals

Microbiologicals

Brazilian Biological Market



2% of the pesticide market

Source: Croplife Brasil

Importance of IPM to reduce insecticide use and preserve biological control

Variable	Comparison	Crop season (8 crop seasons) 2013/14	2019/20	Average from 2013 to 2020
Number of insecticide sprayings over the crop season	IPM	2.3 (46 growers)	1.7 (255 growers)	1.9
	Non-IPM	5.0 (333 growers)	3.0 (553 growers)	3.9
Days until first insecticide spraying	IPM	60 days	62.5 days	68.4 days
	Non-IPM	33 days	45.1 days	38.9 days
Pest control costs (kg/ha)	IPM	144.6	108.0	120.2
	Non-IPM	301.8	180.0	244.3
Yield (kg/ha)	IPM	2,953.8	3,864.0	3,490.5
	Non-IPM	2,920.2	3,804.0	3,416,3

≈ 50% less insecticide

Source: Bueno et al. (2021)

Importance of NBC to *Helicoverpa armigera* mortality

Location (Paraná cities)	Sampled larvae	Parasitoids (parasitism %)	Entomopathogens (% infection)	Nematodes	Indetermined dead	Number of moths
Andirá	79	20 (**25.3**)	2 (**2.5**)	-	1	56
Astorga	15	8	-	-	1	6
Bela Vista do Paraíso	10	5	2	-	1	2
Borrazópolis	589	238	85	2	87	177
Cambé	233	144	22	10	12	45
Campo Mourão	84	60	15	-	7	2
Cruzeiro do Oeste	14	12 (**85.7**)	1 (**7.1**)	-	-	1
Jataizinho	17	3	8	-	-	6
Londrina	13	6	1	-	-	6
Marilândia do Sul	192	106	8	-	11	67
Maringá	20	9	2	-	-	9
Palotina	18	12	-	-	1	5
Rolândia	10	8	1	-	-	1
São Jorge do Ivaí	20	13	-	-	1	6
Ubiratã	35	22	4	-	6	3
Wenceslau Braz	38	12	3	-	1	22
Total	**1387**	**678**	**154**	**12**	**129**	**414**
Percentage (%)		**48.9**	**11.1**	**0.9**	**9.3**	**29.8**

70% of natural mortality

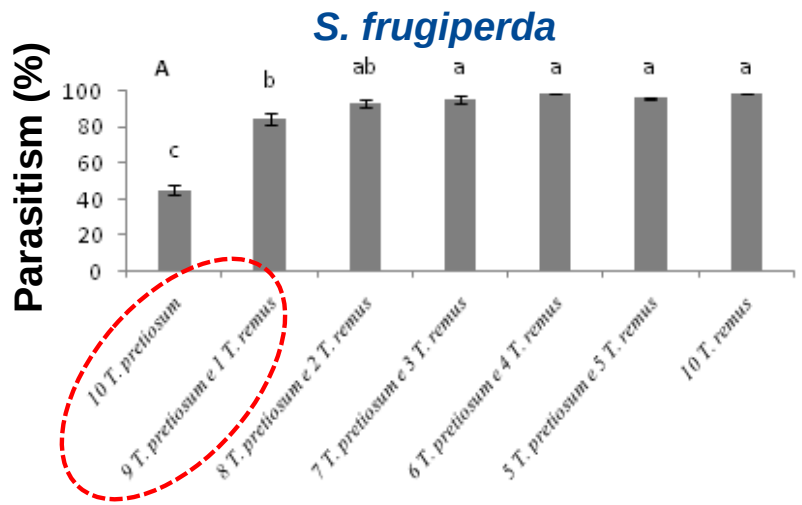
Predation was not taken into consideration

Corrêa-Ferreira et al. (2014)

ABC of *Spodoptera* spp. using egg parasitoids

Telenomus remus

Host species	Lifetime parasitism	Parental female longevity (days)	Reference
S. frugiperda	35.7	9.6	Bueno et al. (2010)
	140.8	8.3	Pomari et al. (2013)
	220.0	10.6	Bueno et al. (2014)
S. cosmioides	115.3	13.1	Pomari et al. (2013)
S. eridania	139.5	8.0	Pomari et al. (2013)
A. gemmatalis	200.5	12.4	Bueno et al. (2014)



Trichogramma pretiosum

Host species	Lifetime parasitism	Parental female longevity (days)	Reference
S. frugiperda	14.8	9.8	Bueno et al. (2010)
A. gemmatalis	51.40	5.0	Bueno et al. (2011)

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Importance of biological control tools for the uptake of BC in LAC

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Biological control research and publications resulting from the partnership

Colmenarez *et al.*
CABI Agriculture and Bioscience (2022) 3:5
https://doi.org/10.1186/s43170-021-00071-6

CABI Agriculture and Bioscience

REVIEW Open Access

The use of *Telenomus remus* (Nixon, 1937) (Hymenoptera: Scelionidae) in the management of *Spodoptera* spp.: potential, challenges and major benefits

Yelitza Coromoto Colmenarez[1], Dirk Babendreier[2], Francisco Ramón Ferrer Wurst[3], Carlos Luis Vásquez-Freytez[4] and Adeney de Freitas Bueno[5*]

Proceedings of ISBCA 6 – D.C. Weber, T.D. Gariepy, and W.R. Morrison III, eds. (2022) *page 6.6*

The importance of biological control in the management of *Helicoverpa Armigera* in Brazil: The example of soybean

Adeney de Freitas Bueno[1], Yelitza C. Colmenarez[2], & Débora M. da Silva[3]

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Proceedings of ISBCA 6 – D.C. Weber, T.D. Gariepy, and W.R. Morrison III, eds. (2022) *page 2.4*

The use of *Telenomus podisi* in augmentative biological control of *Euschistus heros* in soybean

Adeney de Freitas Bueno[1], Yelitza C. Colmenarez[2], and Rodrigo M. A. Maciel[3]

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Biological control research and publications resulting from the partnership

CAPÍTULO 24

Uso de parasitoides como bioinsumo no cultivo da soja

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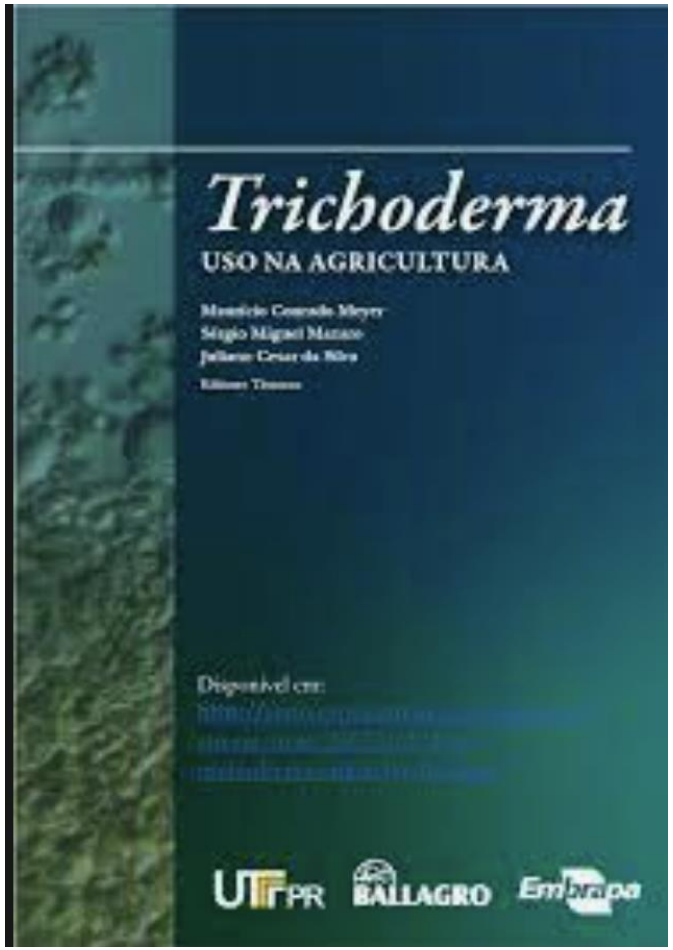
Fernanda Caroline Colombo
Yelitza Coromoto Colmenarez
Bianca Vique Fernandes Narde
Fabrício Fagundes Pereira



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Final Message

- ✓ **Both CABI and Embrapa have many goals in common and its our mission to find ways to strengthen this partnership in the search for a more sustainable agriculture.**

- ✓ **Biological control can be a start but not the limit of many different goals we can accomplish together.**

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