

Session #: Title

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Augmentative biological control, where large numbers of natural enemies are periodically introduced, is commercially applied on a large area in various cropping systems worldwide (van Lenteren, 2000a; van Lenteren and Bueno, 2002). It is a popular control method applied by professional and progressive farmers, and stimulated by the present international attitudes in policies of reducing pesticide use.

Two forms of periodic releases with natural enemies are generally distinguished: the inundative and the seasonal inoculative method. The inundative release method is where beneficial organisms are collected, mass reared and periodically released in large numbers to obtain immediate control of a pest (i.e. use as a biotic insecticide). An example is the use of *Trichogramma* spp. against the cornborer in maize in Europe (Bigler, 1994). The seasonal inoculative release method is where natural enemies are collected, mass reared and periodically released into short-term crops (6–12 months) and where many pest generations occur. A worldwide review from 1977 (Ridgway and Vinson, 1977) provides data about the use of natural enemies in the USSR (on 10 million hectares), China (1 million hectares), West Europe (< 30,000 hectares), and North America (<15,000 hectares). Since that review many new natural enemies have become available (Anonymous, 2000).

Table 1.1. Average area, production and the value of barley production for 1994-98.

	Area harvested (million ha)	Production (Mt)	Value (million \$)
World	66.8	150.3	23,257
Developing countries	19.0	27.4	4017
Central Asia	4.4	3.4	
Kazakhstan	3.9	2.8	251
WANA	13.7	19.1	



Fig. 1. Figure legend.

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References

- Acosta, J. (1590) *Historia Natural y Moral de las Indias*. Fondo de Cultura Economica, Mexico.
- Aldrich, D. (1984) *World Pineapple Production and Marketing*. Dole Packaged Foods Co., Honolulu, Hawaii.
- Aleman, G., Farkas, D.F., Torres, J.A., Wilhelmsen, E. and McIntyre, S. (1994) Ultra-high pressure pasteurization of fresh cut pineapple. *Journal of Food Protection* 57(10), 931–934.
- Aman, K.N. (1993) Control of packaging options. In: Barnes, P. and James, A.O. (eds) *Ginaca Pineapple Processing Machine*. John Wiley & Sons, Chichester, UK, pp. 12–24.
- Anon. (1997) *Market Asia – Japan Import Statistics*. Asia Regional Agribusiness Project/Fintrac Inc. [Accessed 2000.] Available from <http://www.fintrac.com/rap/>
- Anon. (1998a) *FAOSTAT Database*. Food and Agriculture Organization of the United Nations. [Accessed 2000.] Available from <http://apps.fao.org/>
- Anon. (2002) *FAOSTAT Database*. Food and Agriculture Organization of the United Nations, Rome, Italy.
- Anupunt, P., Chairidchai, P., Kongswat, A., Isawilanon, S., Subhadrabhundu, S. and Siripat, S. (2000) The pineapple industry in Thailand. In: Subhadrabandhu, S. and Chairidchai, P. (eds) *Proceedings of the Third International Pineapple Symposium*. International Society for Horticultural Science, Pattaya, Thailand, pp. 99–107.
- Baker, B. (1990) *World Pineapple Production*. United States Department of Agriculture, Foreign Agricultural Service, Washington, DC.
- Beer, J.G. (1857) Die Familie der Bromeliaceen. In: *Monographie des Ananas. Belgique Horticole (Liège)*, 28, 144–172.