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Item 7.1 of the Provisional Agenda

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Twelfth Regular Session

Rome, 19 -23 October 2009

MAIN FUNCTIONS AND SERVICES PROVIDED BY MICRO-ORGANISMS RELEVANT TO FOOD AND AGRICULTURE

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I. INTRODUCTION

1. The Commission, at its Eleventh Regular Session, noted that, while many types of micro-organisms and invertebrates play critical roles in the provision of essential services within the food chain, the biodiversity of micro-organisms and invertebrates for food and agriculture had not received adequate attention. The Commission further recognized the important role of micro-organisms and invertebrates in relation to food security and sustainable agriculture, and the need to strengthen capacity and knowledge in order to further understand the many roles and functions of these essential resources in relation to sustainable agriculture.¹

2. The present document gives an overview of the main functions and services provided by micro-organisms in food and agriculture. The main described functional groups relevant to agriculture are: soil micro-organisms; biological control agents, plant pathogens; farm animal pathogens; micro-organisms used in agro-industrial processes and micro-organisms used in biotechnology processes; the main presented functional groups of relevance to food processing are: beneficial and non-beneficial micro-organisms. Table 1 below, lists these main micro-organism functional groups and the key services they deliver; the table also includes some specific examples for illustrative purposes.

TABLE 1: MAIN SERVICES OF MICRO-ORGANISMS IN RELATION TO FOOD AND AGRICULTURE²

Functional groups	Services	Micro-organisms (examples)	Examples
Agriculture			
Soil regulators	Plant growth promotion (regulatory)	FUNGI Mycorrhizal fungi	Facilitate nutrient and water acquisition by plants by colonizing plant roots and extending far into the soil
	Nutrient cycling (supporting)		
	Soil formation (supporting)		
	Water regulation (provisioning)		
		BACTERIA - Nitrogen fixing bacteria such as <i>Rhizobium</i> spp. - <i>Azotobacter</i> spp (free-living)	- Enable nitrogen fixation after establishing inside root nodules of legumes - Supply small amounts of nitrogen to plants when in their proximity
Biological Control Agents	Disease regulation (regulatory)	BACTERIA - <i>Bacillus thuringiensis</i>	- kill the caterpillar stage of a wide array of butterflies and moths
	Invasive species management (regulatory)	FUNGI Endophytic fungi, such as <i>Gliocladium catenulatum</i>	Reduce incidence of Witches' Broom Disease in cacao plants by inhibiting the growth of the <i>Crinipellis perniciosa</i> fungus

¹ CGRFA-11/07/Report, paragraph 65.

² The Millennium Ecosystem Assessment defines ecosystem services as "...the benefits people obtain from ecosystems. These include provisioning, regulating, and cultural services that directly affect people and supporting services needed to maintain the other services." Parts of this table have been adapted from the "Millennium Ecosystem Assessment. Ecosystems and Human Well-Being. A Framework For Assessment, 2003".

Non-beneficial micro-organisms	Spoiler agents Health hazardous microbes	BACTERIA <i>Staphylococcus aureus</i> <i>Vibrio cholerae</i>	Produce toxins in food, causing food poisoning when ingested Produce enterotoxin in the small intestine, which causes Cholera, an acute intestinal infection
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