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The role of field populations and local varieties of fodder maize in sustainable agriculture.

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Abstract

Presently there is a growing interest in the recovery of local varieties of maize to be used in alternative production systems such as in eco-friendly agriculture, low-input and organic agriculture. This interest is due to the lack of adaptation of modern varieties to these more challenging cultivation systems. The genetic heterogeneity that characterizes local varieties confers them a certain degree of yield stability when confronted with seasonal climatic variations, pathogen attacks, and low levels of fertilization. Their productivity is generally lower than that of the commercial hybrids, as these local varieties evolved in primitive agricultural systems, with low levels of fertilization, submitted to a moderate selective pressure that favoured “disease resistance” and “weather hardiness” in hand with “grain productivity”.

The objective of this study was to evaluate the productivity and quality of different genotypes/ local varieties of fodder maize produced in different agricultural production systems in Galicia, Spain.

The tests were conducted in 2009 and 2010 with the experimental area arranged in a split-plot design with three replicates. The main parcels represented the production system: conventional agriculture with mineral fertilization (LC), sustainable management with cattle manure fertilization (PV) and sustainable management with pig manure fertilization (PC). The sub-parcels were the maize varieties, with 16 of these evaluated in 2009 and the remaining 32 in 2010. The production of dry matter was the highest in LC (14.2 and 10.1 tDM/ha in 2009 and 2010 respectively), followed by the PV system (13.1 and 8.8 tDM/ha in 2009 and 2010 respectively), and the PC system (12.1 and 8.7 tDM/ha in 2009 and 2010 respectively). In PC there was an increase in the starch content and a decrease in the acidic fibre content and neutral detergent of the fodder. Therefore, the production system based in sustainable management with pig manure fertilization seems to favour the production of biomass. Despite this fact, LC and PV can still be considered better options due to the higher protein content and higher digestibility of the fodder obtained in these production systems. The local varieties that most distinguished themselves in terms of productivity and digestibility were “Mondariz” “Oia”, “Ribadumia x EC49A”, “Pontareas” and “Pontareas x EC49A” in the year 2009 and “Berastegui”, “Guernika” and “Azpeitia” in the year 2010 . Thus, the present results suggest that some fodder maize populations and local varieties can be successful alternatives to modern commercial hybrids in the context of a more environmentally and ecologically minded agriculture.