Use of Velvetbean (*Mucuna pruriens* var. utilis)to increase maize production in summer and winter cycles

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Abstract
The maize production system in the "Los Tuxtlas" region involves two associated issues, namely the decline in production along with a progressive deterioration land. The slash-and-burn system, as a persistent land use, shows a trend towards decline and is becoming useless. In the case of maize crops, low land fertility (particularly low N levels) represents the main restriction to increase production. Among the dozens of well-known cover crops velvetbean (Mucuna pruriens var. utilis) has been described as one of the most popular cover crops currently grown in the tropics and with a high Thus, this on-farm research proposal has the following: Produce knowledge on the effect of the maize-Mucuna rotation system (summer and winter cycles) on land biota and production.The experiment was conducted on the demonstrative field (Luvisol soil, FAO 2006) with a history of maize cultivation located in the San Pedro Soteapan "ejido" (Biosfera "Los Tuxtlas", Veracruz, Mexico) from 10 july 2007 to 22 march 2009. In this field under a complete randomized 2 x 2 factorial design was set up to evaluated the effects Mucuna and Fertilizer (urea) on the preservation of land biota and production in the summer (cycles three) and winter (cycles two) maize production systems. Four treatments were evaluated: without Mucuna and without Fertilizer (-M-F); with Mucuna and without Fertilizer (+M-F); without Mucuna and with Fertilizer (-M+F); with Mucuna and with Fertilizer (+M+F). Each treatment had 5 replicated (with 20x25 m each one). Each maize cycle, the soil biota (diversity, abundance and biomass) and soil physical-chemical (texture, MO, N, P, K, Ca, Na and CIC) variables was recorded after 70-75 days after sowing (began flowering). The quality (N and P) and quantity (dry matter) was measured in Mucuna's foliage. Maize was assessed in terms of density, dry matter production and nutrient content (N and P) in each component.The production average of two cycles of production of Mucuna for the cycles of summer and winter was of 4.2 and 5.8 ton MS/ha, respectively; that is, the plants of summer and winter maize used approximately 95 and 129.5 kg/ha of nitrogen. In the first cycle of summer maize (2007 line basis), with the application fertilizer, the design of the established experiment (relief) did not have a significant effect ($F=0.53$; $P<0.05$), it functioned with 1318.3 kg/ha (varied from 674.1 to 1962.5 kg/ha). In both cycles of the "tapachole maize" the Mucuna had a highly significant effect on the grain ($F=3.69$; $P<0.001$) and stubble ($F=3.78$; $P<0.001$) mass. The handling with Mucuna (+M-F and +M+F) produced highest average grain and stubble mass, than without Mucuna (-M-F and M+F). Also in both cycles of winter (2008 and 2009) the handling with Mucuna had a significant influence in the grain production ($F=3.64$; $P<0.001$) and the stubble did not had it ($F = 0.61$; $P<0.05$). In presence of Mucuna (+M+F y +M-F) the average production grain was highest, than when Mucuna was absent (-M-F y M+F). However, the handling with and without Mucuna had similar stubble mas. The beneficial impact of M. pruriens on crop yields (e.g. maize) has also been widely documented. Our findings showed that the cycle of summer maize produced a greater amount of grain than the one of winter. In addition, the production was influenced by the amount of the rain that fell in the three years. This experience demonstrated that it took place more grain and maize stubble when the rotation with Macuna becomes and explains because some farmers of Mecayapan and the others tropical regions of Mexico (Tabasco, Chiapas, Oaxaca and Yucatan) mention that always they obtain good maize harvest.

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