Tropentag, September 17-19, 2013, Stuttgart-Hohenheim

"Agricultural development within the rural-urban continuum"

Intercropping Alfalfa with Maize is a Promising Agricultural Mode in Northeast Agro-Pastoral Areas of China

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Abstract

In China, the northeast agricultural and pastoral area is an important grain commodity and animal husbandry base. However, there are a number of growing challenges to food and eco-environmental security as well as sustainable development of animal husbandry, owing to the unfavourable natural conditions and unreasonable utilisations of the population. It is crucial to find suitable intercropping modes between crops and legumes and to explore its advantages. Here, a field experiment was conducted as a completely randomised block design with five treatments: (a) maize monoculture in even rows; (b) maize monoculture in alternating wide and narrow rows; (c) alfalfa monoculture; (d) maize intercropped with 1 row of alfalfa in wide rows; (e) maize intercropped with 2 rows of alfalfa in wide rows.

Results showed that changing maize monoculture in even rows into alternating wide and narrow rows improved light intensity and transmission of the group, which promoted the growth and development of maize and enhanced its grain yield and output value by 6.8 %. Compared to monoculture, intercropping alfalfa with maize formed differentiation both in time and space, which optimised resource utilisation and enhanced comprehensive benefits of the composite group. The total yield of maize intercropped with 1 row of alfalfa and with 2 rows of alfalfa was respectively 1.7 % higher and 7.0 % lower than that of maize monoculture in wide and narrow rows and output value was correspondingly enhanced by 4.5 % and decreased by 3.7 %, whereas both total yield and output value were improved relative to monoculture alfalfa, respectively by 52.4 % and 48.6 %, 39.2 % and 36.9 %. Meanwhile, these two intercropping modes improved land use capability respectively by 28 % and 24 %.

It is concluded that intercropping alfalfa with maize has obvious advantages, and the optimal mode is maize intercropped with one row of alfalfa in wide rows. This mode is practicable and has a promising prospect in the northeast agro-pastoral zone of China.

Keywords: Accumulation and allocation of dry matter, comprehensive benefits, intercropping advantages, light environment

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