

# Sustainable Subsistence Farming Based on Nitrogen Flow: how should it be managed?

## -A Case Study at Kanchevo village, Bulgaria-

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### 1. Background

Insufficient supply of nitrogen to farmland may decrease soil fertility, while excessive supply of nitrogen may lead to such environmental problems as groundwater pollution. Nitrogen flow and nitrogen balance are widely recognized as environmental indicators for agriculture. It is said that the combination of crop growing and stock breeding can circulate materials in one farm system. In Bulgaria subsistence farming generally includes both of them. However the application of animal manure may supply excessive nitrogen to small farmland because fruit and vegetables which are primary crops for subsistence farming absorb less nitrogen than cereals and beans while animal manure relatively contains much nutrient. This study deals in two subsistence farms. The objectives of this study are 1) to estimate each nitrogen flow, 2) to discuss the elements influencing each nitrogen balance and relation between the subsistence farming studied and environment, 3) to suggest how to manage nitrogen in the farm systems studied that can lead to their sustainability.

### 2. Material and methods

Each nitrogen flow was estimated for two subsistence farms at Kanchevo village in Kazanlak, Bulgaria, where Internship program was done by the author. Two subsistence farms were selected based on their farmland sizes in order to analyze the influence by farmland size. Farm 2 cultivates the standard farmland area in this region, Farm 1 the larger. Both farms own arable land where fruit and vegetables are grown, meadow and rose field. In this study, the border of the household plot is regarded as the border of the system studied. Three compartments, "farmland", "human" and "animal" compose the system. A site survey was conducted to collect the data for the estimation of nitrogen flow. In order to compensate the lack of data, statistical data and the articles related to this study were used.

### 3. Results

Nitrogen balance was 5kg negative at Farm 1 and 8kg positive at Farm 2. It can be said that nitrogen input entering to the system is excessive at Farm 2. Much nitrogen circulates between "animal" and "farmland". Although subsistence farming intends self-supply of basic food, the quantity of nitrogen supplied as subsistence food was small compared to that of purchased food. It was found that these three factors had much influence on the nitrogen balance and the nitrogen flow in the farming systems studied; 1) nitrogen supplied to the farmland through animal manure, 2) nitrogen removed by crops from farmland, 3) cultivation of grass and maize which absorb much nitrogen..

### 4. Discussion

It is necessary for sustainable subsistence farming to manage the way of farming based on nitrogen flow and to increase nitrogen circulating inside the farming system. The application of animal manure and human feces to rose field can decrease waste nitrogen. Since subsistence farming in Bulgaria puts the most importance on food security, it is required to design sustainable subsistence farming without changing the way of farming. For that purpose, it is suggested to establish a system based on a village where nitrogen is managed and redistributed.