農村都市協働による有機農業の生態系サービスの評価および価値創出モデルの検討

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目的

埼玉県小川町の下里集落は、1971年に有機農業を開始した金子美登氏（霜里農場）を中心として、2003年より集落全体が有機農業への転換に取り組み、「有機の里」として知られている。また、有機農業従事者は農地に近接する里山の落ち葉を堆肥利用し、農用林として利用している。その集落でも高齢化や耕作放棄地など、里山・農地の維持・管理に課題を抱えている。本研究では、NPO法人霜里学校が霜里農場や地域住民と協働し、有機農業をテーマとした農業・加工・里山体験・下里分校の活用、都市・農山村交流などの活動を行い、環境保全に取り組む。また里山の生物多様性・炭素吸収量を調査することで、下里集落の生物多様性、生態系サービスを明らかにし、農業体験や貸し農園に参加する交流者などを対象に、有機農業の環境保全への貢献や生物多様性の価値を学ぶプログラム、有機農業への支援の意識向上手法を開発する。

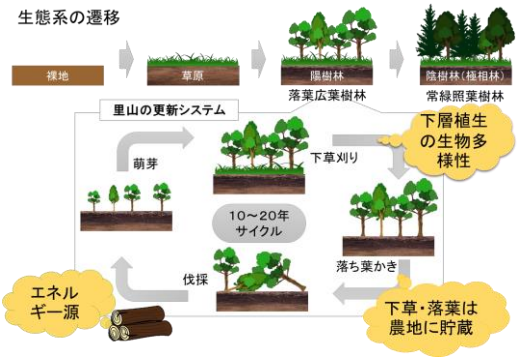
研究・活動の状況

プロジェクトの意義

土壌有機炭素への着目

土壌中の炭素の量は、植生の3倍、大気の2倍のポテンシャルを持っている。水田や畑では、土壌炭素が増加すれば、その分、大気中のCO_2を吸収したと考えることができるので、土地利用、管理（農法）によって人為的な要因で変化する炭素量の増減に注目が集まっている。本プロジェクトは特に里山と有機農業の連携に着目し、里山の資源を人為的に土壌に還元することで炭素の固定量を増加する効果的な手法を検討する。

二酸化炭素吸収だけでない生態系サービスのとしての価値



これまでの調査により、霜里農場の所有する40年管理の里山においては、落ち葉かき、下草刈りが行われてきたことにより、生物多様性が高いことがわかった。そこで本年度は、里山から農地に投入されている落ち葉の炭素量を計測し、里山から農地につながる有機農業全体を評価する農地の炭素貯蔵量調査を実施し、今回の標本調査の対象とした土壌深度30cmに限れば、有機農法は慣行農法に比べ炭素含有量が25.6t/ha多いことがわかった。

2016年9月と12月の2回の土壌調査における有機農業と慣行農法の土壌炭素含有量の違い
（標本：各畑の3地点から100ccの土壌サンプルを採取した平均値）

炭素含有量分散分析：一元配置

概要

グループ	標本数	合計	平均炭素含有量（%）	分散
慣行農業	11	21.4	1.95	0.20
有機農業	17	51.1	3.01	1.44

分散分析表

変動要因	変動	自由度	分散	観測された分散比	P-値	F 境界値
グループ間	7.51	1	7.51	7.81	0.01	4.23
グループ内	25.02	26	0.96			
合計	32.53	27				

有機農業の炭素含有量は95%の有意差で慣行農業より多い

有機農業には里山の資源が必要であり、その維持のための費用・労働力は、有機農業従事者・地域のボランティアが負担している。農産物を消費する都市住民側は、おいしい、身体に良い、安心・安全だけでなく、環境への配慮や生物多様性への貢献といった価値への理解と行動が必要とされている。

有機農業と里山保全の市民参画・理解促進活動

活動研究３年目の今年は、地域の中で里山の雑木を薪や炭として利用するビジョンをワールドカフェで共有し、その具現化の形としてタケ伐採・タケ薪・炭活用ワークショップを行った。

体験ワークショップの実施
①2017年4月2日(日)10:00～12:30　タケ伐採
②2017年4月15日(土)10:30～16：30　炭焼き・BBQ利用
@小川小学校旧下里分校

続けていくための課題

まとめ

本プロジェクトの取り組みを、生態系サービス向上の観点を強調した活動モデルとしてマニュアル化を行った。

Examining the Evaluation and Value Creation Model of Ecosystem Services in Organic Farming through Cooperation between Farming Villages and Urban Areas

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Objective of Research/Activities

Centered on Yoshinori Kaneko (Frostpia Farm), who began organic farming in 1971, Shimozato Village of Ogawa-machi in Saitama Prefecture launched an initiative in 2003 for the entire village to switch to organic farming, for which it has come to be known as "the organic village." Moreover, the people involved in organic farming have been using the mountains around their farmland as a farm forest by using the fallen leaves to make compost. The village however, faces "satoyama (woodland near villages)" and farmland maintenance and management issues, such as an aging population and abandoned fields and paddies. In this research, NPO Shimozato-Gakkou cooperates with farms and local residents in Shimozato to engage in activities based on the theme of organic farming to preserve the environment through farming, processing, "satoyama" workshops, making use of Shimozato Branch School, exchange programs between urban areas and mountainous farming areas, etc. Moreover, the research aims to clarify Shimozato Village's biodiversity and ecosystem services by investigating the biodiversity and amount of carbon absorbed by the "satoyama," to develop programs to allow participants in farm tours and rented farms to learn about how organic farming contributes to environmental preservation, and the value of biodiversity, and also develop methods for raising awareness for organic farming support.

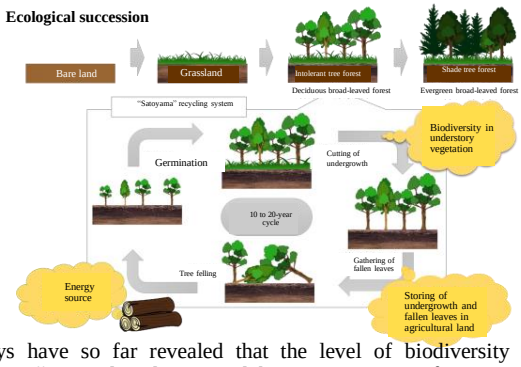
Drtailed Activities

Significance of the Project

● Focusing on Organic Carbon in the Soil

Soil has the potential to store three times the amount of carbon stored in vegetation, and twice the amount in the atmosphere. If the amount of carbon in the soil could be increased, it means there will be less CO_2 in the atmosphere. Attention is focusing on the effects of human activity in terms of land use and management (farming methods) on the amount of carbon. This project focuses particularly on the relationship between the "satoyama" and organic farming, and examines effective means of increasing the amount of fixed carbon by intentionally returning resources from the "satoyama" back to the soil.

● Valuable Ecosystem Service, Not Only as a Means of Absorbing Carbon Dioxide



Surveys have so far revealed that the level of biodiversity is high in the "satoyama" owned and managed by Frostpia Farm for 40 years due to the gathering of fallen leaves and cutting of undergrowth. Starting this fiscal year, we decided to measure the amount of carbon contained in the fallen leaves, which are gathered from the "satoyama" and plowed into the fields. We are studying the amount of carbon stored in agricultural land to evaluate the entire practice of organic farming from the use of "satoyama" to the fields.

Differences in the amount of carbon contained in the soil between organic and conventional agricultural methods, as shown in two soil studies conducted in September and December 2016
(Samples: Average values taken from 100cc of soil samples obtained from three locations of each field)

Analysis of carbon variance: One-way layout

Overview

Group	No. of samples	Total	Average amount of carbon contained (%)	Variance
Conventional agriculture	11	21.4	1.95	0.20
Organic agriculture	17	51.1	3.01	1.44

Variance analysis table

Variation factor	Variation	Degree of freedom	Dispersion	Observed variance ratio	P value	F boundary value
Between groups	7.51	1	7.51	7.81	0.01	4.23
Within groups	25.02	26	0.96			
Total	32.53	27				

The amount of carbon in organic agriculture was more than in conventional agriculture with a significant difference at 95%.

Organic farming requires the resources of the "satoyama," and the funds and labor needed to sustain it are provided by organic farmers and local volunteers. As for the people living in urban areas, who consume the products, they not only need to understand the value of the delicious, healthy, safe, and wholesome foods, but they must also contribute to eco-friendliness and biodiversity through action.

● Organic Farming and Activities to Promote the Participation of Citizens and Understanding for the Preservation of "Satoyama"

In the third year of our research and activities this year, we held a workshop for everyone, including local farmers, local residents and urban residents, to look at how we could make local use of the "satoyama" trees as firewood and charcoal, and what we could do to make the fallen leaves available to people who want to use them.

Implementation of experience workshop

(1) Sunday, April 2 2017, 10:00 - 12:30 Cutting bamboo trees
(2) Saturday, April 15 2017, 10:30- 16：30 Use in charcoal grilling/BBQ
@Former Shimozato Branch of Ogawa Elementary School

Utilization of charcoal, the product from the last term

100% self-sufficiency BBQ workshop, on producing food and alcohol using energy from organic vegetables/bed log Shiitake mushrooms/wild boars and deer captured in the region

Having fun during a charcoal grilling workshop

Securing fuel for the next BBQ

Toward a cycle of sustainability

Issues in continuing with initiatives

There were few participants in the workshop on cutting bamboo trees (6 people), so the workload for each participant was very heavy.

Wood splitting is a job that can be easily carried out even with a small number of people, so the process was effective.

The wood produced is utilized at the Shimozato Branch school.

Summary

The initiatives undertaken in this project were consolidated in the form of a manual, for use as an activity model that emphasizes the perspective of improving ecosystem services.