The issue of soil pollution solved using organic farming #2: Tried-out research of soil biodiversity

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INTRODUCTION

This poster presents a case study from Thailand, which focuses on producing safe food, achieving zero hunger and a healthy environment to achiev the SDGs. The case study concerns the research conducted on the issue of soil pollution solved using organic farming #1. The study was conducted on the way the soil for rice planting retained pollutants from agrochemical's usage and how soil recovered thanks to agricultural practices such as organic agriculture and crop rotation by legumes planting and the use of organic fertilizers instead.

In particular, for this research, we focused on studying soil diversity and the organic farming method. Soil biodiversity is essential to sustainable agricultural productivity to the benefits of humans. This includes the nutritive principles coming from rice such as the soil fauna biodiversity in organic agriculture. The chemical properties of the soil includes the organic cation exchange in the soil. The physical properties of soils include soil moisture as well as organic degradation. The aim of this research is associated with the number and type of soil biodiversity- in terms of soil fauna - such as springtails, caterpillars and ants that can be used as biological indices. These are also responsible for creating minerals and nutrients that will go in the final product, rice (main-crop), or legumes (crop-rotation) that can be used to produce food nutritious as much as regular food produced for consumption.

MATERIALS AND METHODS

Random sampling was carried out at 28 sites = 22,400 squared meters in Thailand's organic farms to study the biodiversity of macro-fauna in soil tests. The results were compared using two methodologies per eight times of data collecting. The study involved also the nutritive principle of the yield used for producing food, all data were analyzed by the SPSS Program.

MAIN RESULTS

Fig. 1: Soil fauna used in the experimental research and the yields of experimental plots

We found 12 Phylum of Arthropoda Order Acari Family Oribatidae, total = 664 pcs. in 8 testing at the sample sites, the highest value indices of diversity were mites, springtails, caterpillars and ants. And there was no difference in nutrition value as Carbohydrate, Protein, Fat, Vitamin and Fiber of the legumes and rice from biodiversity organic sample field compare with the other products.

Table 1: Types and numbers and biodiversity Index of 8th testing by Shannon-Wiener Diversity Index

Phylum Arthropoda Order Acari Family Oribatidae	No. Soil Fauna/Bio Index #1	No. Soil Fauna/Bio Index #2	No. Soil Fauna/Bio Index #3	No. Soil Fauna/Bio Index #4	No. Soil Fauna/Bio Index #5	No. Soil Fauna/Bio Index #6	No. Soil Fauna/Bio Index #7	No. Soil Fauna/Bio Index #8
Order Araneae Family Onnopidae	25/0.35	18/0.29	23/0.27	29/0.26	39/0.26	48/0.25	55/0.24	67/0.23
Order Scolopendromopha Family Scolopendreilidae	9/0.22	11/0.22	16/0.22	25/0.22	33/0.23	44/0.24	56/0.24	79/0.27
Order isopoda Family Ligiidae	10/0.23	12/0.23	15/0.22	21/0.22	31/0.23	44/0.24	57/0.24	88/0.27
Order Chordeumatida Family Anthroleucosomatidae	9/0.22	9/0.20	18/0.24	21/0.22	34/0.24	50/0.26	74/0.28	91/0.27
Order Collembola Family Entomobryidae	6/0.17	8/0.18	12/0.19	17/0.20	21/0.18	30/0.19	42/0.20	57/0.21
Order Diptera Family Cecidomyiidae	15/0.28	19/0.29	21/0.26	25/0.24	33/0.24	47/0.25	49/0.22	54/0.20
Order Hemiptera Family Cicadidae	5/0.15	8/0.18	11/0.18	23/0.23	39/0.26	44/0.24	64/0.26	71/0.24
Order Hemiptera Family Formicidae	2/0.08	6/0.15	6/0.12	10/0.14	13/0.13	18/0.14	21//0.13	23//0.12
Phylum Nematoda Class Phasmida	3/0.10	5/0.13	9/0.16	10/0.14	15/0.15	19/0.14	24/0.14	39/0.17
Phylum Annelida Order Crassiclitellate Family Megascoiecidae	6/0.17	9/0.20	15/0.22	18/0.20	22/0.19	28/0.18	32/0.17	41/0.17
Phylum Annelida Order Crassiclitellate Family Megascoiecidae	11/0.24	13/0.24	19/0.25	25/0.24	29/0.22	33/0.20	46/0.21	54/0.20
Total	**101**	**118**	**165**	**224**	**309**	**405**	**520**	**664**

Table 2: Nutrition composition of Green bean, Red bean, Soil bean. Starches compare with Flours by (%)

100g	Protein %	Fat %	Vitamin%	Mineral%	Fiber %	Carbohydrate%
Green bean	3	2	37	49	2.6	6.4
Red bean	48	1	2.3	14.7	26	8
Soil bean	16.9	19.9	16	29.1	8.1	10
Rice	10.2	3	4	6.3	15	61.5

DISCUSSION AND CONCLUSION

The soil biodiversity discovered in the rice paddy cultivated using organic farming and crop rotation by legumes created/increased those organisms such as mites, springtails, caterpillars and ants, that can be used as biological index for the soil environment. Soil fauna increased the nutrient, humidity and soil properties such as the nutrients circulation processing in the soil. By transforming the organic into inorganic matters, the cooperation with the microorganisms within the soil to increase soil humidity for the degradation rate of organic objects, adjustments to pH values, which are related to the increasing of number and type of those fauna. All these brought more advantages in both physical and chemical biodiversity's qualification of the soil. To conclude, organic farms' soil biodiversity and soil fauna was essential to produce the nutrients for the plants that can produce food such as bakeries, which are nutritious as much as in normal farming production systems. However, through organic farming it is possible to advance in achieving zero hunger and a healthy environment to support the SDGs, Agenda 2030.