

A better utilisation of residues through liquid composting

Afsender

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3 Forskningsområde/research area related to in the call

The project is primarily targeting the research area 3.8.

4 Problemformulering/Problem statement

Organic agriculture involves a holistic approach to farming that integrates biological and natural management techniques instead of solely treating the symptoms of problems by applying artificial chemicals. In other word organic farming works on developing suitable, sustainable and natural condition for plant growth. According to the IFOAM Survey 2004, more than 24 million hectares are managed organically world-wide. As a result for that, there is growing interest among the organic growers to learn more about sustainable and organic management methods. In order to achieve good production, organic systems rely on the use of many natural and biological materials to supply the soil with the necessary nutrients for plant growth and protect plants from pest and disease problems. **Using the agricultural residues is very important for making agriculture less dependant on the external inputs.**

One of the most promising organic farming techniques nowadays is the use of liquid compost and manure. Such techniques is being used by local farmers in many parts of the world and increasingly also by the industry. Unfortunately the share of agricultural scientists in that field is very limited for many reasons.

Liquid compost is described by Bess (2000) as different preparations made using compost as a starting material and producing a liquid extract or in some cases a liquid version of the original compost. The difficulty in studying liquid compost resulted by the variation in composted materials, purpose of liquid compost application, variety of biological and chemical components in the liquid compost, preparation and application methods.

Using liquid compost was part of farming technique centuries ago, when animal manures were steeped in water and the resulting liquid was poured around plants. New equipment results in liquid compost with more oxygen incorporated, super-oxygenated through air being incorporated during compost fermentation (Robson, 2000). **The interest in using organic teas for the agriculture purposes has grown rapidly in both the developed and the developing world but it develops very differently in various parts of the world.**

Liquid compost is known commercially as compost tea in the US and Australia. Extension services and compost companies in United States and Australia have attempted to define the most appropriate method for liquid compost preparation. Special attentions were given to the aeration and incubation equipments.

In Asian countries like Korea and Thailand, growers were more concerned about the microbes types and value of using effective microorganisms (EM). To some extent the knowledge can be seen as traditional low-external-input knowledge, e.g. Cambodia and Thailand,

In African countries like Kenya and Egypt, more interest were given to the suitable residuals to be composted, but unfortunately most of the work done there is not well documented.

The growing interest in liquid compost world wide is caused by its special properties and benefits for both soil and plant; actually there is harmony between the holistic approach of organic farming and the use of multi purpose liquid compost. So what are the chemical and biological characteristics of liquid compost in relation to liquid compost effect?

- **The ability of liquid compost to provide plant with nutrients** is depending on the age and kind of material used. The nutrients from fresh manure teas tend to be especially macronutrients. Organic teas also increase vigour and hardness of the plant by providing both micronutrients (building blocks of plant enzymes, vitamins and hormones) and the organic chelating agents that make them available.
- **Producing useful organic compounds for plant growth:** More young or unstable compost will result in extracts contains some available nutrients not yet fixed in microbial biomass, but they provide organic compounds like sugars and amino acids, plus organic chelating agents (like humic and fulvic acids that carry extracted micronutrients to plants). This could describe the increase of root length in treated plants (Grobe, 2003).
- **Enhancing the soil biological activity and disease suppression** since organic extracts contain long chain carbon molecules, which provide carbon and oxygen for useful soil microbes including mycorrhiza. The increasing activity and numbers of these beneficial organisms especially those who live in the rhizosphere will create successful disease suppression by many different mechanisms (Scheverell, 2003).
- **Enhances soil physical properties:** Teas made from fresh composts (aged less than six months) contain fewer nutrients than manures, but they provide humic acids which has great influence on the soil physical properties. Finally, different crops respond differently to extracts from a variety of sources (Merrill and Mckean, 1998; Welke, 1999).

Little information is available about these aspects; also the negative effect of compost extracts in some cases still needs more explanations.

5 Formål/aim

The aim of the study will be to collect data on practices on liquid composting techniques to:

- Review the current state of knowledge
- Create a network among researchers in the developed and the developing with interest in liquid compost
- Generate experimental empirical knowledge on the key mechanism leading to differences in the end product and its potential use
- Generate a model, which is able to describe the running chemical and biological processes during liquid compost preparations and to predict the response of plant and soil to its applications.

6 Metode/Methods

From the problem description part it is very clear that gaining more knowledge about the liquid compost by performing single separated experiments is not enough, since a lot of variables deter-

mine the final product and its application. Also the obtained results can't be generalized. What is needed in the first case is to document and benefit from the existing experience and local knowledge among organic growers and specialists in many extension services. Scanning for the activities done in that field and producing some documentary articles should take a high priority in order to keep such knowledge and develop it. Then supplementary experiments could be performed if needed with collaboration with the local expertise. Establishing network which involves scientists, liquid compost producers, organic growers who are interested, is highly required for the information flow and experiences exchange. Setup internet website, workshops and specialized seminars will be nice tool to achieve that.

There could possibly be coordination with the expression of interest submitted by Andreas de Neergaard.

7 Bidrag til forskeruddannelse, formidling og internationalt samarbejde/ Contribution to research education, international cooperation

The project will have an important element of communication and networking internationally.

It will in that way stimulate the interest in the scientific community and a deliberate aim will be to establish PhD projects on the issue on local universities.

The project will thus contribute to research education on local universities by offering supervision.

8 Tidsplan og budgetoverslag/time plan and suggested budget

Budgetoverslag (1000 kr)

	2005	2006	2007	2008	Total
VIP, mdr	3	3	3	3	12
TAP, mdr	0	3	3	0	6
Løn udgift	100	200	200	100	600
Drift	100	100	100	50	350
Overhead	40	60	60	30	190
I alt	240	360	360	180	1140

International cooperation

Already identified partners with interest to collaborate:

- Kenyan Institute for Organic Farming (KIOF), Nairobi, Kenya
- Soil science department, Ain Shams University, Cairo, Egypt: Prof. Dr. Ahmed El-Araby (ecoas@internetegypt.com)
- Università degli Studi di Bari, Dipartimento di Biologia e Chimica Agro-Forestale ed Ambientale, Bari, Italy: Prof. Dr. Teodoro M. Miano (miano@agr.uniba.it)
- Mediterranean Agronomic Institute – CIHEAM, Bari, Italy: Dr Lina Al-Bitar (albitar@iamb.it)
- Punjab Agricultural University, India: Dr. Rajinder K. Kalra(rajinderkaurkalra@yahoo.com)
- Bangladesh Rice Research Institute (BRRI), Bangladesh: Senior Agronomist Dr Bilash C. Roy (bilash_roy@yahoo.com)
- Srer Khmer, a Cambodian NGO, working with organic agriculture. Mrs. Sinang Yun, c/o Provincial Department of Agriculture, Forestry and Fisheries of Siem Reap. (phone 012 850629)

- Chitedze Agricultural Research Station, Lilongwe, Malawi. Mr. Amos Ngwira (amosingwira@yahoo.co.uk)

Competencies among applicants

Henning Høgh Jensen has research experience as project coordinator and project participant in several projects in Denmark as well as internationally. His focus has always been on recirculation and nutrient supply in low-external-input agriculture. He is currently employed as associate professor at KVL. Further information at <http://www.agsci.kvl.dk/~hhj/>

Ahmed El-Naggar is a PhD student at the agriculture science department in KVL. He is currently engaged with PhD research project about the use of plant extracts and amino acids role in organic agriculture. Having some practical experience in plant nutrition in organic farming systems from his work in Ain Shams University in Egypt and during his master study at IAM in Bari, Italy.

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