



VERMECO

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Can weeds be transformed into biomanure by earthworms....?

Weeds have been an integral part of agriculture from the very beginning. This unwanted biota competes successfully with crops for water, light, space and nutrients encumbering growth and production of cropping plants. Besides this, these plants increase crop pests interfere with crop culture, reduce crop quality, harm animal and human health, contaminate water body and also interfere in non - cropped areas creating environmental imbalances. We are facing tremendous loss especially in grains production due to such sundry nature of weeds. The damage caused by them is as serious as caused by insects and diseases. But even today, the extent of loss due to weed infestation has yet not been properly assessed.



Although it is estimated that amongst the annual agricultural loss in India, weeds account for 45%, insects 30%, diseases 20% and other pests 5%. Thus of the four groups of agricultural pests the greatest losses are caused by weeds (Mandal, 1997). Mani *et al.* (1968), in a study, have reported that weeds incur a loss of 31.5% in food grain crops of which the maximum loss was in the Kharif season. Reduction in yield due to weeds was maximum in sugar beets (70.3%) followed by onion (68%), sugarcane (34.2%), linseed (34.2%), ground nut (33.8%) and Peas (32.9%). In recent years, it is realized that adoption of new technology for weed control is a pre requisite for increasing crop production.

Changing of weed control practices from traditional manual or mechanical to weedicidal have a diverse and adverse impact on the whole crop production procedure. The approach of weed problem should be considered as a whole system wherein the technology, training of techniques, economics, public information and sociological aspects of weed control should be involved. The selected technology should be useful towards a weed free agriculture for weed free crops.

Weed control technology is to be considered as a part of the production system, primarily to increase crop-yield, maintain soil fertility and labour utilization intensity during

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Message from the Vice Chancellor

Increasing food supply to meet the requirement of additional population has always been a challenge. This task became more onerous in the decade of 1960s with 'explosion' in population growth. Special efforts were made to increase food production. The strategy of 'green revolution' focused on increasing food-grains production by using various type of chemical fertilizers. But the excessive use of these led to weakening the inherent strength of the soil and in many cases productivity became resistant to further use of these inputs. Many other harmful effects were also visible due to disproportionate use of chemical fertilizers resulting in air, water and food pollution of various types. That is why micro nutrient and environment friendly bio fertilizers came to be used along with recalling the most traditional methods of maintaining and increasing the fertility of the soil. In addition to this, weed infestation, use of chemical insecticides and pesticides to protect crops from being damaged have presented themselves as big problems in their right. Farmers usually become helpless as how to solve these and move on the path of sustainable agricultural development.



Many of the problems adversely affecting land productivity still continue and are troubling more the poor farmers. Weed infestation, for example, is yet to be eradicated completely from agricultural lands and water bodies. The Vermiculture and Vermicomposting Centre of the University is striving hard in the direction of developing new bio techniques that are also financially viable and easy to adopt for addressing the land related problems of the farmers. The Centre is also organizing regular training cum awareness programs at the village and block levels and also in schools in areas where the problems are more pressing.

I hope the contents of this Bulletin will be useful and motivating for the enlightened farmers and young scientists working in this area and they will come forward to help solve the related problems of the farmers in a more sustainable manner. I wish this mission every success.

(Prof. Mohd. Muzammil)
President (SEER)

Centre's Role in Transfer of Technology



i) The programme was organized on the "Use of Vermicompost for Sustainable Agriculture" in block Faridpur, district Bareilly. Nearly 300 farmers attended this meet. The main speakers were, Ch. Harveer Singh, Former BDO, Faridpur; Dr. S.M Singh, in charge (NABARD Project) and Shri Mahendra, Progressive Farmer on 2nd October, 2011.

ii) This awareness programme was held in Sardar Patel Kanya Inter College, Ahrolla, district Bareilly on "Organic Fertilizer: Need of the Day" on 28th Nov., 2011. Nearly 100 girls of 12th standard had participated. In this programme 30 students had been chosen for training programme at Vermicomposting Centre of the University. Besides students, the programme was attended by Dr. S.M. Singh, Project In charge- NABARD, Mr. O. Prakash, Subject Expert, Ms. Rachna and Ms Neha Ajay (Researcher in Organic Farming, Ms Manju Gurah, Principal of the College and Ms Bala Saxena, Vice Principal of the College. The program was funded by NABARD.



iii) This programme was organized to the Graduate students of Aadarsh Degree College, Nababganj, district Bareilly on "Environmental Conservation: Organic Fertilizer the Only Option" on 21st Dec., 2011. Nearly 150 students participated in the programme. 25 students were enrolled for the training programme at the university

Centre. The main speakers of the programme were: Mr. AK Gupta DDM (NABARD), Bareilly; Dr. S.M. Singh, Project In charge (NABARD); Mr. AK Pathak, Principal of the College, Mr. Om Prakash-Subject Expert etc.

iv) The Centre organized a training program on "Paryavaran Sanrakshchan- Jaivik Khaad Ek Vikalp" in association with NABARD in Shishgarh block, Bareilly on May 13th, 2012. Nearly 115 people attended the meet.



Circular cum Invitation

3rd National Symposium on Earthworm Ecology & Environment (NSEEE-3)

Venue: Department of Zoology, Tripura Central University, Tripura

In association with the Society for Earthworm Ecology & Environmental Research (SEEER), **November 09-11, 2012**

Major Themes

Earthworm Taxonomy & Biogeography
Applied Earthworm Biology & Physiology
Earthworm Ecology & Biodiversity
Earthworm and other Soil Biota Interactions
Earthworm Ecotoxicology
Soil Health Management in North East India
Earthworm Technology and Sustainable Agriculture
Earthworm in Medicinal Importance
Environment & Health

Dead Lines

*Submission of Abstract August 30th, 2012
*Acceptance of Abstract October 09th, 2012
*Registration & Accommodation fee August 09, 2012

Registration fee

External Delegates Rs. 2000=00
Local Delegates Rs. 1000=00
Research Students Rs. 700=00
Students Rs. 500=00
Accompanying Person Rs. 800=00

Registration form may be computed having name, sex, designation, address, phone/mobile nos., fax, email, Type of participation (Oral or poster), Title of the paper, author/s, name and sex of accompanying person (if any), Accommodation required (yes/no), Date of arrival and departure, Details of registration/accommodation fee (DD no. Dated Amount in Rs.).

Signature of Delegate

All payments should be made in favor of Convener (NSEEE-3) payable at SBI, Tripura University Campus Branch (Code no.10495, S/BA/C No. 32186670011). Registration form along with fee should reach the Convener on or before August 30th, 2012.

Contact Person: **Dr. P.S Chaudhury**, Convener (NSEEE-3), Department of Zoology, Tripura Central University, Suryamaninagar-799 022, TRIPURA. Mobile no.09863312480; Phone: 0381-2379084. E-mail:nsee3@rediffmail.com

Cost of weeds and their possible use as compost for effective management

Weeds can simply be defined as plants the virtue of which is still unknown or exploited. They will probably continue to infest terrestrial/aquatic crops, non-crop situations and greatly influence harvest yield/quality despite a large array of chemicals, mechanical and biological tools available for their effective control. Weeds have both direct and indirect cost and influence our everyday life. They usurp essential nutrients, moisture and reduce yields, crop quality and interfere with agricultural operations. Weeds also interfere with recreational activities in aquatic areas and in parks and playgrounds and several alien weed species are causing ecological disaster by suppressing the natural vegetation. There are approximately 250,000 species of plants worldwide; of those, about 3% or 8000 species behave as weeds. Losses caused by weeds vary depending on weed infestation, crops and management practices adopted. Crops with wide space and slow initial growth suffer more from weed competition. Weeds have been found to reduce the yield of wheat, rice, sorghum and maize by 30, 44, 31, and 46%, respectively compared to chemical weed control (average of 17 locations throughout India). Other than yield reduction weeds usurp 40-7-35, 29-9-32, 34-9-25, 47-8-56, 67-38-57, 42-18-100 and 57-20-116 kg/ha of N-P₂O₅-K₂O, respectively in wheat, rice, sorghum, maize, ragi, cotton and sugarcane.



Losses caused by weeds in US were assessed to the tune of US\$ 8.9 bn/year in the eighties; this does not include the cost of herbicides, machinery and application (\$ 6.3 bn). A decade later losses by weeds came down to \$7.1 bn/yr, but the total cost increased to \$19.6 bn/yr. These losses are obviously much more in India than US or other developed countries where the share of herbicides is nearly 40-50% to all pesticides used compared to only 18% of pesticides used in India for weed control. In India, losses caused by weeds were estimated at 48,000 crores annually in the last decade of the century. Losses caused by a single invasive/alien weed, *Parthenium hysterophorus* were estimated `1200 crores/annum. It was estimated that invasive weeds in US engross 3 million acres per year costing US \$137 bn in 2006. In crops, a modest yield loss of 15% by weeds in wheat in India cost `15,000 crores/annum and the cost of wheat weed *Phalaris minor* alone was estimated at `4000 crores/year. This is a huge cost for a developing country. It is not that in other countries weeds have been tamed. In Australia loss in crop yield was estimated at AUS\$ 2.5 bn/yr with the use of herbicides worth AUS\$ 1.5 bn/yr. These countries are net exporters of good grains and can afford some yield losses by diverting extra acreages, that choice; however, is not available to Indian farmers, where land for cultivation is decreasing fast due to population pressures

(housings/industry/mall etc.) and there is a yield plateau in the major production zones due to over exploitation of natural resources (water and soil fertility), necessitating effective weed management.

Weed can be controlled by manual, mechanical, chemical and biological methods. Manual weeding being a cumbersome and low paid job used to employ mostly ladies and children, but due to the new labour laws and thanks to NREGA, labour is not available for weeding. Mechanical method is less effective under all situations and thus herbicides form a tool of choice for effective weed management, but so far farmers have limited choice of herbicides to control diverse weed flora. Herbicide use is bound to increase from the present US\$200 million in the near future to increase food grain production meeting the need of India's burgeoning population. A single system of weed management is not effective for long and an integrated approach is desired to lower weed pressure causing economic losses. Biological weed control is slow and effective only against a selective few weed species. Use of weeds for food/feed/fodder and raw material for cottage industry and preparing mulch (to control weeds and reduce soil moisture loss) as also for making compost offers great scope to lower their onslaught on crops. Many weed species have been used as fodder for cattle and even nutritive value of some of them is no less than several fodder crops. *Trianthema portulacastrum*, *Chenopodium album*, *Amaranthus viridis*, *Azolla pinnata*, *Lemna minor*, *Nelumbo nucifera*, *Polygonum barbatum* and *Alternanthera philoxeroides* have >20% crude protein (similar to Lucerne) besides Ca, Mg, K, P, Na, Mn, Cu, Cr, Mn and Iron. However, they need to be uprooted before seed formation as the seeds of many weeds pass through the digestive tract of animal without losing viability and can inundate fields through FYM. The critical period of crop-weed competition is the first one-third of total crop growth duration and weeds uprooted after this period will not help in achieving potential yield. Weeds producing huge biomass (aquatic weeds) and those which are not grazed can best be utilized for composting. Care, however, need to be taken that these are fully decomposed (no viable seeds) for their effective use to enrich fields rather than disseminating seeds to create more problem areas. Weeds for example, *Eichhornia crassipes*, *Salvinia molesta*, *Typha latifolia*, *Phragmites karka* and *Parthenium hysterophorus* which are in abundance and of little use can be utilized for composting. They need to be used in combination as their fiber and nutrient composition (and water content) vary and also require different time to decompose.

Dr. Samunder Singh, Weed Scientist, Department of Agronomy, CCS Haryana Agricultural University, Hissar-125 004 (Haryana), India

Indian Earthworm Ecologist-2

Prof. Radha D. Kale (b.1946)

Dr. Kale – a former Professor of Zoology at the University of Agricultural Sciences, (G.K.V.K. campus), Bangalore, is a globally recognized earthworm scientist. She obtained her M.Sc. and PhD Degrees from Bangalore University, Bangalore (Karnataka) - is a member of the National Academy of Sciences, India, and World Organization for Humus Production and International Scientific Society for Interdisciplinary Sciences, Germany. Prof. Kale who has 40 years of research experience on Applied Biology, Physiology and Ecology of Earthworms, mostly on agricultural aspects and solid waste management- is a recipient of State Award from Pollution Control Board and Department of Environment and Forestry, Karnataka in 1995; Dr. M.R. Bhinday's Award, Mumbai in 1998 and a National Award for Women's Development through the application of Science & Technology by DST, Government of India in 2004.



She has made pioneering contributions to Vermiculture and Vermicomposting technology that helped the agricultural community to revive the fertility status of the agricultural lands on one hand and to utilize all the biodegradable waste in the production of vermicompost that helps to keep the environment clean on the other. She has published around 140 scientific papers in National and International journals and contributed full chapters to two books that have been published in USA. She has written two books in English entitled, "Earthworm - Cinderella of Organic Farming and Vermicompost- Crown Jewel of Organic Farming" and two books in local language, Kannada. Her book, Earthworm-Cinderella of Organic Farming is read all over the world. She guided 5 M. Phil. and 2 PhD students.

Prof. Kale has also served as Secretary and Vice-President of Indian Society of Soil Biology and Ecology and as a member of International Scientific Advisory Committee consecutively for four symposia on Earthworm Ecology held in France, USA (twice) and Spain. She was an invited speaker on earthworm and related topics in many International Conferences held in USA, China, South Korea and Philippines.

Presently, Director at the Centre for Scientific Research and Advanced Learning, Mount Carmel Autonomous College, Bangalore. She is serving as Member of Program Advisory Committee for SC/ ST women, DST, Government of India. She is also an honorary advisor and consultant to various Governmental and Non-Governmental Organizations and a member of NCERT Publication on Vermicomposting.

cropping season. This technology has to play a unique role in an interdisciplinary and integrated approach to protect the crops from enormous losses by weeds, to secure the soil fertility and to decrease the energy input to a minimum. VERMECO discusses on the present scenario of Cost of weeds and their possible use as compost for effective management with one of the senior weed scientists, Dr. Samunder Singh of Haryana Agricultural University, Hissar.

Weed control through the agency of earthworms is a relatively new weapon in the weed management practices. Earthworm Ecology and Environmental Research Laboratory and the Centre for Vermiculture & Vermicomposting of Mahatma Jyotiba Phule Rohilkhand University, Bareilly, in a long term study of eight years, had experimentally proved that weeds could be transformed into biomanure by introducing epigeic species of earthworm, *Eisenia fetida* with least labour input. We have vast varieties of weeds around. We can start biocomposting right now and protect our agricultural land and aquatic bodies from weed infestations. Apply vermicompost and perk up soil fertility for sustainable rural and urban development with care.

Satyendra M. Singh
Editor



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