Cultivating the Future Based on Science

Volume 1
Organic Crop Production

Proceedings of the Second Scientific Conference of the International Society of Organic Agriculture Research (ISOFAR), held at the 16th IFOAM Organic World Congress in Cooperation with the International Federation of Organic Agriculture Movements (IFOAM) and the Consorzio ModenaBio, 18 - 20 June 2008 in Modena, Italy
Cultivating the Future Based on Science. Volume 1 - Organic Crop Production. Proceedings of the Second Scientific Conference of the International Society of Organic Agriculture Research (ISOFAR), held at the 16th IFOAM Organic World Congress in Cooperation with the International Federation of Organic Agriculture Movements (IFOAM) and the Consorzio ModenaBio, 18 – 20 June 2008 in Modena, Italy. International Society of Organic Agriculture Research (ISOFAR), DE-Bonn; Institute of Organic Agriculture (IOL), DE-Bonn; Research Institute of Organic Agriculture (FiBL), CH-Frick, Danish Research Centre for Organic Food and Farming (DARCOF), DK-8830 Tjele, Denmark

ISBN: 978-3-03736-023-1
# Table of contents

## Preface
17

## Dear Reader
19

## Acknowledgements
21

## Soil organic matter management
23

The Impact of Site and Management Factors on Humus Dynamics in Long-term Field Experiments
24

Brock, C. & Leithold, G.

Indicators for the Evaluation of Soil Organic Matter and their Application in Organic and Conventional Farming Systems
28

Hoyer, U., Reents, H.-J & Hülsbergen, K.-J.

Organic and biodynamic cultivation - a possible way of increasing humus capital, improving soil fertility and providing a significant carbon sink in Nordic conditions
32

Granstedt, A. & Kjellenberg, L.

Are soil biological properties and microbial community structure altered by organic farm management?
36

Stark, C.H.

A New Approach to Humus Balancing in Organic Farming
40

Brock, C., Hoyer, U., Leithold, G. & Hülsbergen, K.-J.

Soil quality indicators in organic and conventional farming systems in Slovakia
44

Lehocka, Z., Klimekova, M. & Bielikova, M.

The importance of amino-N for humus formation studied by comparing amino-N input to the soil and soil total nitrogen content in long-term experiments
48

Schuler, Ch., Raupp, J. & George, E.

Changes in light fraction soil organic matter and in organic carbon and nitrogen in compost amended soils
52

Owen, J., Lynch, D. & Fillmore, S.A.E.

Effects of organic matter input on soil microbial properties and crop yields in conventional and organic cropping systems
56

Chirinda, N., Olesen, J.E. & Porter, J.R.

The Potential Role of Organic Soil Fertility Management in the Kenya Highlands
60

Bett, K.E., Freyer, B. & Leonhartsberger, P.

## Nutrient management
65

A Conceptual Framework for Soil management and its effect on Soil Biodiversity in Organic and Low Input Farming
66

Koopmans, C.J. & Smeding, F.W.
Improving Soil Structure and Nitrogen Use Efficiency by GPS-controlled Precision Tillage Technology in Organic Farming
Zanen, M. & Koopmans, C.J.

Season-long supply of plant-available nutrients from compost and fertiliser in a long term organic vs. conventional snap bean rotations experiment
Owen, J., LeBlanc, S. & Fillmore, S.A.E.

Elemental Contaminants in Fertilizers and Soil Amendments Used in Organic Production
Baker, B. & Tracy, D.

Management Strategies and Practices for Preventing Nutrient Deficiencies in Organic Crop Production

Potential of Oil Palm Empty Fruit Bunch (EFB) as Fertilizer in Oil Palm (Elaeis guineensis L Jacq.) Nurseries
AdeOluwa, O.O. & Adeoye, G.O.

Use of a mixture of biotite- and apatite-rich rock powder in a soil with inherent low soil fertility
Bleken, M.A., Krogstad, T., Speetjens, K. & Heim, M.

Soil Fertility and Biodiversity effects from Organic Amendments in Organic Farming
Zanen, M., Bokhorst, J.G. & Koopmans, C.J.

The effects of different cattle manure levels and branch management methods on organic production of Cucurbita pepo L.
Jahan, M., Koocheki, A., Nassiri, M. & Dehghanipur, F.

Inoculation affects nitrogen balances of composts and growth, yield and microflora of Phaseolus beans
Sangakkara, U.R., Weerasekera, D.N., Attanayake, K.B. & Attanayake, A M U.

Nitrogen management
Nitrate leaching and energy efficiency of stockless arable systems compared with mixed farming and a non-organic system on fertile soils in Northern Germany
Loges, R., Kelm, M., & Taube, F.

Legume catch crops for reducing N leaching and substituting animal manure
Askegaard, M. & Eriksen, J.

Winter grazing as an alternative to mulching or mowing grass clover swards
Westphal, D., Loges, R & Taube, F.

Nitrogen balances in Dutch organic greenhouse production
Cuijpers, W.J.M., Burgt, G.J.H.M. van der, & Voogt, W.

Mineral nitrogen in the course of a cash crop and two livestock rotations - first results from the long-term monitoring Trenthorst
Schaub, D., Paulsen, H.M., Böhm, H. & Rahmann, G.
Autumn sown catch crop understoreys as strategy to reduce nitrate leaching in winter cereals
Loges, R., Mauscheming, I., & Taube, F.

Plant nutrition
Agronomic options for the management of phosphorus in Australian rain-fed organic broadacre farming systems
Penfold, C.M. & McNeill, A.M.

Comparison of effect of zinc-enriched pod of Phaseolus vulgaris and inner rice husk composts with zinc sulphate and zinc 14% chelate on zinc availability in maize plant in a calcareous soil
Rasouli, S., Azizi, P., Forghani, A. & Asghar Zade, A.

Nitrogen Utilization in Integrated Crop and Animal Production
Seuri, P.

New Approaches to Phosphorus Regulation and Management
Cornish, P.S. & Oberson, A.

Economic aspects of the application of different organic materials as N-sources in organic production of lettuce
Čabilovski, R., Manojlović, M., Bogdanović, D. & Bavec, M.

Element composition and quality of lettuce (Lactuca sativa var. Biweri), grown with sheep-manure composts

Potentials of beneficial micro-organisms
Plant-probiotic microorganisms for a sustainable buffer of input reduction in organic and low-input tomato production systems
Baruffa, E., Picard, C., Sabbioni, F., Petrozza, A., Giovannetti, G. & Bosco, M.

Tools for innovative organic breeding arise from rhizosphere microbial ecology
Bosco, M. & Picard, C.

How effective are ‘Effective Microorganisms’? Results from an organic farming field experiment
Mayer, J., Scheid, S. & Oberholzer, H-R.

Influence of organic farming on arbuscular mycorhizal fungal populations in a Mediterranean agro-ecosystem.
Bedini, S., Cristani, C., Avio, L., Sbrana, C., Turini, A. & Giovannetti, M.

Biological profitability of maize inoculation with selected rhizosphere micro organisms (Pseudomonas fluorescens and Glomus intraradices) under Water Deficit Stress
AghaaliKhani M. & Ehteshami S.M.R.

Role of forage legumes mixed cropping on biomass yield and bacterial community composition
Zarea, M.J., Ghalavand, A & Jamshidi, E.
Mycorrhization of winter wheat cultivars in organic farming
Friedel, J.K., Jakupaj, S., Gollner, M., Hrbek, R., Flamm, C., Oberforster, M., Zeichner, E., Kinasstberger, A. & Löschenberger, F.

Preliminary Findings on the Arbuscular Mycorrhizal Colonization of Organic Wheat
Kirk, A., Fox, S., Entz, M. & Tenuta, M.

Soil fertility
in Mediterranean organic farming systems I
Polienal results on soil N management and maize N nutrition by green manuring
Benincasa, P., Tosti, G., Boldrini, A., Tei, F. & Guiducci, M.

Effects of green-manure and organic fertiliser on organic maize (Zea Mays L.) in south Tuscany
Mazzoncini, M., Migliorini, P., Antichi D. & Vazzana, C.

Natural biofertilizers for organic agriculture: productivity and nutrient uptake of Medicago sativa inoculated with different arbuscular mycorrhizal fungi
Avio, L., Pellegrino, E., Bonari, E., & Giovannetti, M.

How Perennial Grass has Modified Distribution of Organic Carbon in a Peach Orchard in Emilia-Romagna Region (Italy)
Montecchio, D., Francioso, O., Gioacchini, P. & Ciavatta, C.

The effect of green manure on root development and cotton yield under Mediterranean conditions
Thomopoulos, P., Bilalis, D., Konstantas, A. & Ethimiadou, A.

Quality assessment of citrus-processing industry waste compost for organic and conventional farming

Controlling insect pests of stored organic chamomile by controlled atmospheres
Hashem, M. Y.

Soil fertility
in Mediterranean organic farming systems II
N availability after long-term organic farming in irrigated and rain-fed Mediterranean semi-arid grassy crops
Romanyà, J., & Rovira, P.

Organic vegetable production in Southern Italy: soil fertility management and fertilisation strategies.
Caturano, E., Roccuzzo, G., Canali, S., Adamo, S., Giuffrida, F. & Leonard, C.

Leguminous cover crops: an important tool for improving resource use efficiency in organic arable cropping systems
Antichi, D., Mazzoncini, M., Bárberi, P., Bigongiali, F. & Carpi, G.
Compost enhances parasitization of Brevicoryne brassicae (L.) by Diaeretiella rapae (M’Intosh) in broccoli under different levels of crop diversification and plant competition 236

Ponti, L., Altieri, M.A., & Gutierrez, A.P.

Inorganic nitrogen in soil green manured with biocidal crops 240

Marchetti, R., Casadei, N., Marino, A., & Sghedoni, L.

Annual self-seeding legumes effect on subsequent crops into a rotation program in Mediterranean organic farming systems 244

Al-Bitar, L., Wehbé, E., Ayoub, M., & Jamea, M.

Variety Recommended Lists of Organic Cereals in Emilia-Romagna 248

Piazza, C., Foutry H., Reggiani R., Poli M., & Bolognesi S.

Innovative crop and weed management strategies for organic spinach: crop yield and weed suppression 252

Bärberi, P., Bigongiali, F., Antichi D., Carlesi, S., Fontanelli, M., Frasconi, C., & Lulli, L.

Innovative crop and weed management strategies in organic spinach: machine performances and cultivation costs 256


Physical Weed Control in Organic Carrot in Sicily (Italy) 260

Peruzzi, A., Raffaelli, M., Fontanelli, M., Frasconi, C., Ginanni, M., & Lulli, L.

Innovative Mechanization of Garlic in Vessalico (North Italy) 264

Peruzzi, A., Raffaelli, M., Fontanelli, M., Frasconi C., Lulli L., & Ginanni, M.

Innovative strategies for physical weed control on processing tomato in the Serchio Valley (Central Italy) 268

Peruzzi, A., Raffaelli, M., Ginanni, L., Lulli, L., Frasconi, C., & Fontanelli, M.

Cropping systems 273

Influence of alleycropping microclimate on the performance of groundnut (Arachis hypogaea L.) and sesame (Sesamum indicum L.) in the semi-desert region of northern Sudan 274

Haider E. Shapo & Hussein S. Adam

The significance of mycorrhizal fungi for crop productivity and ecosystem sustainability in organic farming systems 278

van der Heijden, M.G.A., Rinaudo, V., Verbruggen, E., Scherrer, C., Bärberi, P., & Giovannetti, M.

National-scale modelling of N leaching in organic and conventional horticultural crop rotations - policy implications 282

Schmutz, U., Rayns, F., Firth, C., Nendel, C., Lillywhite, R., Zhang, K., & Rahn, C.

Beneficial System Outcomes in Organic Fields at the Long-Term Agroecological Research (LTAR) Site, Greenfield, Iowa, USA 286

Delate, K, Cambardella, C., Chase, C, & Turnbull, R.
Sustainable management of foxtail meadows through hay making at seed maturity
Huguenin-Elie, O., Stutz, C.J., Gago, R. & Lüscher, A.

Plant genetic resources in mountain oases of northern Oman
Gebauer, J., Luedelling, E., Hammer, K. & Buercert, A.

A Model for Pre-Estimation of Production of Organic Cotton in Iran; Case study of Khorasan Province
Ghorbani, M., Danjani, A., Mahmoudi, H. & Mirakabad, H.Z.

Effects of reduced tillage on soil organic carbon and microbial activity in a clayey soil
Berner, A., Fließbach, A., Nientlispach, B. & Mäder, P.

A new approach to soil tillage for organic vegetable production: permanent beds
Védie, H., Berry, D., Leclerc, B., Grébert, D. & Lhôte, J.M.

Green manures and pulses
Grain yield of different winter pea genotypes in pure and mixed stands
Urbatzka, P., Graß, R., Schüler, C., Schliephake, U., Trautz, D. & Heß, J.

Annual clovers and medicus in living mulch systems: Competition and effect on N supply and soil fertility
Baresel, J. P. & Reents, H.-J.

Effect of green manure on weeds and soil fertility in two organic experimental agroecosystems of different ages. Results from 2 years.
Migliorini, P., Vazzana, C. & Moschini, V.

Effect of undersowing winter wheat with legumes on the yield and quality of subsequent winter triticale crops
Fuchs, R., Rehm, A., Salzeder, G. & Wiesinger, K.

Contribution of N from frequently chopped green manure to a succeeding crop of barley
Frøseth, R.B., Hansen, S. & Bakken, A.K.

Potentially mineralizable nitrogen is soils green manured with biocidal crops
Marchetti, R., Lazzeri, L., Malaguti, L., Orsi, A., & Ponzoni, G.

Agronomic performance of annual self-reseeding legumes and their self-establishment potential in the Apulia region of Italy
Driouech, N., Abou Fayad, F., Ghanem, A. & Al-Bitar, L.

Performance of grain legume crops in organic farms of central Italy
Migliorini, P., Tavoletti, S., Moschini, V. & Iommarini, L.

Influence of intercropping and irrigation frequencies on leaf development and taro (Cocoyam) productivity under organic management
Silva, E.E. da, Azevedo, P.H.S de, Almeida, M.M.T.B., De-Polli, H. & Guerra, J.G.M.
Effect of crop management on weeds, pests and diseases

Effects of husked oat varieties, variety mixtures and populations on disease levels, crop cover and their resulting yields

Clarke, S.M., Jones, H., Haigh, Z., Boyd, H. & Wolfe, M.S.

Exploiting weed management benefits of cover crops requires pre-emption of seed rain

Gallandt, E.R., & Molloy, T.

Direct Seeding of Faba Beans in Organic Agriculture

Köpke, U. & Schulte, H.

Soil tillage in organic farming: impacts of conservation tillage on soil fertility, weeds and crops

Peigné, J., Aveline, A., Cannavaciolo, M., Giteau, J.-L. & Gautronneau, Y.

Effects of crop management factors and the environment on pest and disease incidence in vegetables

Cooper, J.M., Schmidt, C.S., Lueck, L., Shotton, P.N., & Leifert, C.

Effects of Conservation Tillage on Canada Thistle (Cirsium arvense) in Organic Farming

Gruber, S. & Clauepin, W.

Monitoring of click beetles (Agriotes lineatus and A. obscurus) in organically managed farms in Northern Germany

Böhm, H., Koppe, W. & Dreyer, W.

Monitoring Agriotes lineatus and A. obscurus in organic production using pheromone traps

Sufyan, M., Neuhoff, D. & Köpke, U.

The effect of companion plants on Lygus feeding damage to bean

Szafitroweska, A. & Kolosowski, S.

Direct and cultural control of pests and diseases

Effects of homeopathic and mineral treatments on dark leaf spot caused by Alternaria brassicicola on cauliflower

Trebbi, G., Fantino, M.G., Dinelli, G., Marotti, I., Burgio, G., Nani, D., & Betti, L.

Late blight in organic potato growing: managing resistance and early tuber growth


Quassia, an Effective Aphid Control Agent for Organic Hop Growing

Weihrauch, F., Schwarz, J. & Engelhard, B.

The two-spotted spider mite can be controlled by water

Conte, L. & Chiarini, F.

Effects of Trichoderma applications on vines grown in organic nursery

Di Marco, S. & Osti, F.

Efficacy evaluation of copper formulations for the control of lettuce downy mildew (Bremia lactucae)

Gengotti, S., Tommasini, M.G., Antonacci, L. & Bugiani, R.
Evaluation of natural active ingredients and agronomical techniques against flea beetle (*Phyllotreta* spp.) on open field organic garden rocket (*Eruca sativa*) 472
Gengotti, S. & Tommassini, M.G.

The use of copper seed treatments to control potato late blight in organic farming 476
Keil, S., Benker, M. & Zellner, M.

Efficacy of biological insecticides to control the Colorado potato beetle (*Leptinotarsa decemlineata*) in organic farming 480
Kühne, S., Reelfs, T., Ellmer, F., Moll, E., Kleinhenz, B. & Gemmer, C.

Effects of *Trichoderma harzianum* applications on fresh pruning wounds in *Actinidia deliciosa* for the protection against pathogens associated with the "wood decay" of kiwifruit 484
Neri, L., Baraldi, R., Osti, F. & Di Marco, S.

Weed Control in Organic Onion 488
Piazza, C. & Conti, M.

The use of organic certified compost to control soilborne diseases caused by *Phytophthora* spp. 492
Pugliese, M., Gullino, M.L. & Garibaldi, A.

Investigations on the efficacy of different products for the control of *Stephanitis pyri* in an organic pear orchard during the two-year period 2004-'05 496
Vergnani, S. & Caruso, S.

Efficacy of *Cydia Pomonella* granulosis virus (cpgv) in controlling codling moth in the Emilia-Romagna region 500
Vergnani, S., Caruso, S., Boselli, M. & Pasqualini, E.

Yielding and Selected Leaf Diseases of Old Winter Wheat Cultivars in the Organic System 504
Stalenga, J. & Jonczyk, K.

Biological control of kiwifruit and tomato bacterial pathogens 508
Balestra, G.M., Rossetti, A. & Quattrucci, A.

The effect of *Avena sterilis* L. invasion on weed abundance and diversity in conventional and organic cereal fields in the Mediterranean region 512
Armengot, L., José Maria, L., Chamorro, L., Romero, A. & Sans, F.X.

Efficacy Evaluation of Some Copper Formulations for the Control of Grapevine Downy Mildew with Low Dose Applications 516
Bortolotti, P.P., Nannini, R., Scannavini, M., Antoniaci, L. & Bugiani, R.

Olive fly (*Bactrocera oleae*) activity, fruit infestation and temperature in an organic table olive orchard in southern Crete 520
Volakakis, N., Eyre, M.D., Kabourakis, E. & Leifert, C.

Influence of *Vicia hirsuta* control with kainite on winter cereals 524
Lukashyk, P., Berg, M. & Köpke, U.

Efficacy of indigenous botanicals and bio-rationals in the management of cabbage pests in an organic farming system 528
Ssekyewa, C., Mwine, J. ¹, Katanzi, F. ¹ & Kudamba, C.
Laboratory Studies of the Activity of Spinosad against Leptinotarsa decemlineata (Say) Depending on Different Temperature
Kowalska, J. 532

Plant Health and the Science of Pests and Diseases
Boff, M.I.C., Gonçalves, P.A.S. & Boff, P. 536

Soil Fumigation with Allium Sulfur Volatiles and Allium By-Products
Arnault, I., Vey, F., Fleurance, C., Nabil, H. & Auger, J. 540

Pest and Disease Management of Potato Crops with Homeopathic Preparations and Germplasm Variability
Boff, P., Madruga, E., Zanelato, M. & Boff, M.I.C. 544

Cropping techniques wheat
Improvement of winter wheat baking quality in ecological cultivation by enlargement of row spacing and undersown intercrops
Becker, K. & Leithold, G. 550

Agronomic and environmental factors explaining Grain Protein Content variability in organic winter wheat

Organic winter wheat: optimising planting

Improving nutrient uptake in wheat through cultivar specific interaction with Azospirillum
Hoagland, L., Murphy, K., Carpenter-Boggs, L. & Jones, S. 562

Sustainability assessment of wheat production using Emergy
Coppola, F., Haugaard-Nielsen, H., Bastiannoni, S. & Østergård, H. 566

Organic crops
Impact of agronomic measures on yield and quality of organic potatoes (Solanum tuberosum L.) for industrial processing
Haase, T., Haase, N.U. & Heß, J. 572

Effect of Compost versus Animal Manure Fertilization on Crop Development, Yield and Nitrogen Residue in the Organic Cultivation of Potatoes
Willekens, K., De Vliegher, A., Vandecasteele, B. & Carlier, L. 576

Effects of Farm Type and Different Intensities of Soil Tillage on Cash Crop Yields and Soil Organic Matter
Schulz, F., Brock, Chr. & Leithold, G 580

Searching for an alternative oil crop for organic farming systems in temperate climates

Effect of Biofertilizers on Agronomic Criteria of Hyssop (Hyssopus officinalis)
Tabrizi, L., Koocheki, A. & Ghorbani, R. 588

Comparison of Different Intercropping Arrangements of Cumin (Cuminum cyminum) and Lentil (Lens culinaris)
Jahani, M., Koocheki, A. & Nassri Mahalati, M. 592
Yield and quality of organic versus conventional potato crop
Mourão, I., Brito, L.M. & Coutinho J.

Quality of thyme herb (Thymus vulgaris L.) from organic cultivation.
Seidler-Łożykowska, K., Golcz, A., Kozik, E. & Wójcik, J.

Amaranth farming: Rural sustainable livelihood of the future?
Bjarklev, A., Kjaer, T. & Kjaergård, B.

Organic vegetable production

Mineralization of lupine seed meal and seedlings used as N fertilizer in organic vegetable production
Katroschan, K. & Stützel, H.

Use of biodegradable mulching in vegetable production

Minuto, G., Guerrini, S., Versari, M., Pisi, L., Tinivella, F., Bruzzone, C., Pini, S. & Capurro, M.

Japanese organic tomato intercropped with living turfgrass mulch
Xu, H.L., Ma, G., Shah, R.P. & Qin, F.F.

Organic Methods for Control of Root Rot in Pea and Spinach in Northeastern U.S.
Schrum, H., Kotcon, J. & Verlinden, S.

Effects of shading on root and shoot development of melon (Cucumis pepo) transplants in conventional and organic float system nurseries
Bilalis, D., Kanatas, P. & Konstantas, A.

Crop protection and soil fertility in organic okra cultivation in Mauritius
Facknath, S. & Hurree, B.

Research Needs in Organic Vegetable Production Systems in Tropical Countries With a Focus on Asia
Juroszek, P. & Tsai, H.H.

“Aurora Tropical”: a model of Ecological Horticulture, Case studies of 11 Onion and Shallot cultivars

Change in the weed seed bank during the first four years of a five-course crop rotation with organically grown vegetables
Sjursen, H., Brandsæter, L.O. & Seijåsen, R.

Changes in mineral content and CO2 release from organic greenhouse soils incubated under two different temperatures and moisture conditions
Pepin, S., Dorais, M., Gruyer, N. & Ménard, C.

Plant traits affecting thrips resistance in cabbage
Voorrips, R.E., Steenhuys-Broers, G., Tiemens-Hulscher, M. & Lammerts van Bueren, E.T.

Increasing Cultivar Diversity of Processing Tomato under Large Scale Organic Production in California
Barrios Masias, F., & Jackson, L.
Plant breeding

Possibilities for breeding to improve responsiveness to arbuscular mycorrhizal fungi in onion


Response of old, new and organically bred winter wheat cultivars in different farming systems: concept and experimental layout in the DOK field trial

Hildermann, I., Thommen, A., Dubois, D., Boller, Th., Wiemken, A. & Mäder, P.

Does regional organic screening and breeding make sense? Experimental evidence from organic outdoor tomato breeding

Hornburg, B. & Becker, H.C.

Organic wheat breeding

Wheat populations: population performance and stability in organic and non-organic environments

Wolfe, M., Boyd, H.E., Clarke, S., Haigh, Z.E.L. & Jones, H.

Wheat populations: parental performance and stability in organic and non-organic environments

Jones, H, Boyd, H.E., Clarke, S., Haigh, Z.E.L. & Wolfe, M.

Breeding for nitrogen use efficiency in organic wheat systems

Dawson, J.C., Murphy, K.M. & Jones, S.S.

Contribution to organic breeding programmes of wheat variety testing in organic farming in France

Fontaine, L., Rolland, B. & Bernicot, M.H.

Wheat trials networks for determining characters for organic breeding

Rolland, B., Al Rifai, M., Bataillon, P., Fontaine, L., Gardet, O. & Oury, F.X.

Differences between spring wheat cultivars in susceptibility to Fusarium caused seedling blight

Timmermans, B.G.H. & Osman, A.M.

Does Wheat Cultivar Choice Affect Crop Quality and Soil Microbial Communities in Cropping Systems?

Nelson, A., Frick, B., Clapperton, J., Quideau, S. & Spaner, D.

Organic crop production in the tropics

Options for improving soil fertility in the southern part of the Republic of Bénin: Where does Mucuna find its niche?

Akouègnon, G.E., Hoffmann, V. & Schultz-Kraft, R.

Effect of green manure rotation, biol and cultivar on the production of organic spinach (Spinacea oleracea)

Siura, S. & Davila, S.

Organic matter addition in organic farming – Impact on root development and yields in maize and cowpea over dry seasons

Sangakkara, U.R., Bandaranayake, P.S.R.D., Dissanayake, U. & Gajanayake, J N.

Harmonizing Jhum (Shifting Cultivation) with PGS Organic Standards in Northeast India: Key features and characteristics of Jhum for process harmonization

Darlong, V.
What can organic agriculture contribute to sustainable development?
– Long-term comparisons of farming systems in the tropics
Zundel, C., Kilcher, L. & Mäder, P.

Green manuring for tropical organic cropping – A comparative analysis
Sangakkara, U.R., Weerasekera, D.N. & Freyer, B.

Population Density and Distance to Market Does not Influence the Farmers’ Use of Organic Manure
Olayide, O., Alene, A., Ikpi, A. & Nziguheba, G.

Organization of a Sustainable Agroforestry Model for Small Farmers in the Montes de Oro Region, Puntarenas, Costa Rica
Blanco-Metzler, H. & Díaz Porras, A.

Study the effects of conventional and low input production system on quantitative and qualitative yield of Silybum marianum L.
Haj Seyed Hadi, M., Darzi, M. & Sharifi Ashoorabadi, E.

Integrating pigeonpea in maize based farming systems may increase food production and alleviate poverty

Plant Products as Biopesticides: Building On Traditional Knowledge Of Vrkshayurveda: Traditional Indian Plant Science
Balasubramanian, A.V., Arumugasamy, S., Vijayalakshmi, K. & Sridhar, S.

Use of Tharu Ethnobotanical Knowledge for Organic Insect Pests Management of Cucurbita pepo L. cv. ‘zucchini’
Rana Bhat, B.

Knowledge transfer and dissemination
Organic Pilot Farms in North Rhine-Westphalia (Germany)
Stumm, C. & Köpke, U.

The development of an international curriculum on organic farming in China
Pugliese, M. & Gullino, M. L.

Dissemination of Organic Agricultural Information: The Role of Key Communicator Networks in Rural Bangladesh
Sarker, M.A. & Itohara, Y.

Socio-psychological characteristics of farmers in the adoption of organic farming practices in coconut based homesteads of humid tropics

Cross-disciplinary and participatory research methods: What can we learn?
Cross-Disciplinary Analysis of the On-Farm Transition from Conventional to Organic Vegetable Production
Jackson, L., Smukler, S., Murphree, L., Yokota, R., Koike, S.T., & Smith, R.F.

How to promote innovation and interdisciplinarity in organic food and farming research evaluation
Learning in context – improved nutrient management in arable cropping systems through participatory research
Wivstad, M. & Nätterlund, H.

Research - Teaching Integration in Agroecology and Organic Farming
Lieblein, G., Caporali, F., von Fragstein, P. & Francis, C.

How do farmers research and learn? The example of organic farmers’ experiments and innovations: A research concept
Kummer, S., Ninio, R., Leitgeb, F. & Vogl, C.R.

Development of organic farming in distant rural Māori communities in New Zealand through successful participatory approaches
Kerckhoffs, L.H.J.

Promotion of Organic Vegetable Production through Farmers’ Field School in Chitwan, Nepal
Rana Bhat, B. & Ghimire, R.

Research methodology
Towards cognitive holism in organic research
Leiber, F. & Fuchs, N.

Research into Practice: Mind the Gap
Measures, M.

Meta-evaluation of action plans – The case of the German Federal Organic Farming Scheme
Eichert, C.

The sustainable livelihoods approach: A frame for furthering our understanding of organic farming systems
Oelofse, M. & Høgh-Jensen, H.

Challenges in Transitioning to Organic Farming in West Bengal, India
Brodt, S. & Schug, D.

How transgenic crops impact on biodiversity
Kotschi, J.

Experimental systems to monitor the impact of transgenic corn on keystone soil microorganisms
Turrini, A., Sbrana, C. & Giovannetti, M.

Index of Authors
Preface

To carry home these heavy two volumes of ISOFAR’s 2nd Scientific Conference Proceedings might give rise to the question whether these books represent more mass than class and if they are still topical.

After all the author must wonder whether a contribution in a peer-reviewed proceedings volume is worthwhile when there is the alternative of publishing it in a highly ranked scientific journal with the same effort. Moreover, the editors as well as the numerous referees might have felt desperate at times due to the enormous amount of time and strength they invested to compile about 400 selected papers.

I would like to thank all of you for your effort. It was worthwhile since the reader now obtains a valuable overview of the current state of knowledge and research aims of the scientifically based Organic Agriculture which might be important not only for the scientist but also for all other stakeholders interested in the further development of Organic Agriculture.

I owe gratitude to all who contributed to coping with this laborious task. You have all done a tremendous job in contributing to foreseen successful scientific modules held under ISOFAR’s and IFOAM’s joined conference/congress umbrella. Our collective hope is that these proceedings will represent a significant milestone on the road towards a better understanding of the potentials and effects capabilities of a scientifically based Organic Agriculture can have.

Prof Dr Ulrich Köpke
President ISOFAR
Dear Reader,

The two volumes of the Proceedings of the Second Scientific Conference of the International Society of Organic Agriculture Research, 'Cultivating the Future Based on Science', represent a considerable part of the worldwide increase in research activities in Organic Agriculture (OA). This observation is in accordance with the overall trend, at least in much of the western world, of increased production and consumption of certified organic products.

In all, 495 four-page papers were submitted to the conference, and all went through a sophisticated review process resulting in 380 papers being selected for presentation at the ISOFAR Conference. Evaluating papers is a difficult task, requiring a sure scientific instinct. It also requires a reasonable judgement of the quality of the language of each paper; since a paper's language is part of what determines its overall quality, even though this gives an unjustified advantage to native speakers of English. Supported by a review form that checked various aspects of the paper’s quality, the reviewers tried their best to ensure maximum transparency of the evaluation, which basically reflected the objective of improving the paper’s quality.

The first volume deals mainly with various aspects of organic crop production, which traditionally represent the largest share of all papers submitted to conferences on OA. We hope that you will find it interesting to discover the diverse research approaches regarding the management of organic crops. While a tendency to a more problem-oriented approach realized by specialists is evident, as perhaps is to be expected, there is still a strong foundation of papers on traditional agronomy with a systemic approach, which remains a key discipline in OA research. Attentive readers will realize that the diversity of papers also reflects the global differences with respect to an understanding of what OA is.

The second volume gives insights into the increasing research activities on animal husbandry, socio-economics, interdisciplinary research projects, and QLIF workshops, all related to OA. We gratefully acknowledge in particular the increasing interest in organic animal husbandry, which in the past was a poor cousin in OA research. Some topical issues such as global warming and energy supply are discussed in the interdisciplinary sessions.

The scientific committee agreed at the start that cross-disciplinary papers should be given high priority because of the very nature of organic farming and food systems. For many years we have claimed there was a need for a holistic understanding of OA, both because of the interdependencies among sub-systems on the farm (soil-crops-livestock-people) and because of the multiple objectives behind OA (producing wholesome food, conserving soil fertility, maintaining biodiversity, supporting animal welfare, reducing pollution, etc.). However, most often researchers end up meeting and discussing these matters in largely discipline-oriented sessions, even at most organic conferences. Therefore, we wanted to encourage a more cross-disciplinary approach at this ISOFAR event, and we were happy to receive a large number of papers for the cross-disciplinary topics. We hope this tendency will be strengthened in future organic conferences.

Moreover, the great number of papers submitted for the scientific part of the OWC clearly demonstrates the interest in sharing research-based knowledge within the organic sector. To achieve this, it was important to have a section of the OWC where strict methodological approaches are required for participation.
On the other hand, it is a pleasure and an advantage for a scientific conference to be part of a global event that attracts the whole sector and thus allows the researchers to disseminate their findings widely and gain inspiration from other stakeholders in the organic movement.

First and foremost many thanks to all authors who contributed to our joint conference. We also are greatly indebted to the numerous reviewers listed on the next page, who did a first-class job in evaluating hundreds of papers. It was a great pleasure to cooperate with Paola Bonfreschi from the OWC – Organizing Committee, who is the embodiment of reliability and politeness. Last but not least, many thanks to Anja Schneider, of the ISOFAR Head Office, who was mainly in charge of overall communication with the authors and substantially supported the editing of the proceedings.

Managing the review process and editing the proceedings for an international conference is a challenging task in which language difficulties and technical problems may sometimes result in confusion. We kindly ask you to accept our apologies for any problems you may encounter.

We sincerely hope that the Proceedings of the Second Scientific Conference of ISOFAR ‘Cultivating the Future Based on Science’ will be an important and worthwhile source of information and inspiration for you.

On behalf of the Editors,

Daniel Neuhoff, Niels Halberg, Thomas Alfoldi & William Lockeretz
Acknowledgements

Thanks to the following reviewers:

Lucimar S. de Abreu; Brazil; Uygun Aksoy, Turkey; Thomas Alföldi, Switzerland; Hugo Alroe, Denmark; Miguel Altieri, United States of America; Ton Baars; Germany; Saadi Badawy, Egypt; Katja Bahrdt, Switzerland; Beat Basp, Switzerland; Paolo Barbeni, Italy; Stephane Bellon, France; Marc Benoit, France; Marianne Bonde, Denmark; Jules Bos, The Netherlands; Viv Burnett, Australia; Virgilio Caleca, Italy; Enio Campiglia, Italy; Fabio Caporali, Italy; Francois Casabianca, France; Edward Cocking, United Kingdom; Tommy Dalgaard, Denmark; Christophe David, France; Ken Davies, United Kingdom; Robert Delve, United Kingdom; Henrik Egelyng, Denmark; Shariab EL-Bana, Egypt; Thomas van Elsen; Germany; Massimo Fagnano, Italy; Maria Finck, Germany; Andreas Flissbach, Switzerland; Bernd Freyer, Austria; Jürgen Friedel, Austria; Eric Galiandt, United States of America; José Granado, Switzerland; Anna-Maria Häring, Germany; Niels Halberg, Denmark; Ulrich Hamm, Germany; Peter Hanson, United States; Yous Hashem, Egypt; Lene Hegel, Germany; John Hermansen, Denmark; Brendan Hoare, New Zealand; Beate Huber, Germany; Henning Høgh Jensen, Denmark; Todd Kabbaluk, Canada; Manolis Kabourakis, Greece; Lukas Kilcher, Switzerland; Chris Kjeldsen, Denmark; Preben Klarskov Hansen, Denmark; Peter Klocke, Switzerland; Ulrich Köpke, Germany; James Kotcon, United States of America; Ib Sillebak Kristensen, Denmark; Troels Kristensen, Denmark; Paul Kristiansen, United States of America; Stefan Kühne, Germany; Günter Leithold, Germany; Willie Lockeretz, United States of America; Andreas Löscher, Switzerland; Paul Mäder, Switzerland; Bud Markhart, United States of America; Andrea Martini, Italy; Veronika Maurer, Switzerland; Jochen Mayer, Switzerland; Marcelo Mele, Italy; Alberto Mengi, Italy; Charles Merfield, Republic of Ireland; Ioannis Metzidakis, Greece; Paola Migliorini, Italy; Heidrun Moschitz, Switzerland; Daniel Neuhoff, Germany; Egon Noe, Denmark; Erich C. Oerke, Germany; Frank Offermann, Germany; Jørgen E. Olesen, Denmark; Susanne Padel, United Kingdom; Hans-Marten Paulsen, Germany; Bruce Pearce, United Kingdom; David Pearson, United Kingdom; Carola Pekrun, Germany; Christopher Penhold, Australia; Christine Picard, Italy; Gabriele Pietsch, Austria; Gerold Rahmann, Germany; Jesper Rasmussen, Denmark; Joachim Raupp, Germany; Angelika Riefer, Germany; Christine Rudmann, Switzerland; Jürg Sanders, Switzerland; Ulrich Schmutz, United Kingdom; Kathrin Seidel, Switzerland; Pentti Seuri; Finland; Anet Spengler, Switzerland; Christin Stark, United Kingdom; Ulrike Steiner-Stenzel, Germany; Hanna Stolz, Switzerland; Matthias Stolze, Switzerland; Wijnand Sukkel, The Netherlands; Albert Sundrum, Germany; Bertil Sylvander, France; Lucius Tam, Switzerland; John Teasdale, United States of America; Concetta Vazzana, Italy; Els Wynen, Australia; Qiao Yuhui, China; Raffaele Zanoli, Italy; Cesare Zanasi, Italy; Christine Zundel, Switzerland.
Soil organic matter management