CA-CoP CONSERVATION AGRICULTURE COMMUNITY OF PRACTICE

for sustainable production intensification

Alert No. 14 (26 January 2011)

1. 5th World Congress of Conservation Agriculture *incorporating* 3rd Farming Systems Design Conference, 26-29th September 2011 Brisbane Australia.

The 5th WCCA website is online at http://www.wcca2011.org/ Australia, host for the 5th WCCA and 3rd FSD, welcomes scientists and practitioners to Brisbane to discuss current and future developments of sustainable agriculture next year. Conference program options and tours will cater for different interest groups, and take advantage of Brisbane's proximity to intensive, extensive and sub-tropical farming, as well as to world leading research groups and facilities. Next deadline for submitting condensed papers is 28 February 2011.

2. Southern Africa Regional Conservation Agriculture Symposium, 8-10 February 2011, Johannesburg, South Africa

Will This regional Symposium is being organised under the auspices of FAO, NEPAD, FANRPAN and ACT. The objectives of the Symposium are:

1. To share and document information on the biophysical, social and economic impacts of Conservation Agriculture technologies in the region;
2. To share and document experiences on Conservation Agriculture scale up approaches and impacts; and
3. To identify key areas for research and development and explore institutional and policy innovations for Conservation Agriculture scale up.

Regional Symposium Programme For information: TCE-Casymposium-2011@fao.org

3. Innovative No-Till: Using Multi-Species Cover Crops to Improve Soil Health

This webinar addresses multi-species cover crops that can be used to improve soil health, increase biological diversity, and benefit the bottom line in no-till grain operations. An increasing number of grain farmers are experimenting with these "cocktails" of cover crops such as legumes, grasses, and companion crops to keep the soil covered year-round.

During this webinar, Jay Fuhrer, District Conservationist with the National Resource Conservation Service (NRCS) in Bismarck, North Dakota, shared his experience with this innovative no-till approach. Fuhrer presented four on-farm case studies to illustrate how to successfully use cover crop "cocktails" to enhance crop production and livestock forage in a no-till grain operation. Susan Tallman, NCAT agronomist and Certified Crop Advisor (CCA),

also joined the webinar. Video available at:
http://www.youtube.com/user/NCATATTRA#p/u/2/zjI2zWf4uMI or Click for publication.

4. No-till, rotation can limit greenhouse gas emissions from farm fields

WEST LAFAYETTE, Ind. - Using no-till and corn-soybean rotation practices in farm fields can significantly reduce field emissions of the greenhouse gas nitrous oxide, according to a Purdue University study. Tony Vyn, a professor of agronomy, found that no-till reduces nitrous oxide emissions by 57 percent over chisel tilling, which mixes crop residue into surface soil, and 40 percent over moldboard tilling, which completely inverts soil as well as the majority of surface residue. More at:
http://www.purdue.edu/newsroom/research/2010/101220VynNitrous.html

5. Vacancy announcement from IAEA for Laboratory Head (P-5), Soil and Water Management and Crop Nutrition Laboratory, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Vienna, Austria

This is a 3-year fixed-term position based in Vienna. As a member of a team under the direction of the Joint FAO/IAEA Division Director, the Laboratory Head ensures that the activities of the Soil and Water Management and Crop Nutrition Laboratory contribute to the results based subprogramme relating to the development of improved soil and water management techniques for sustainable intensification of agricultural production systems through the use of nuclear and related techniques.

The Head of the Soil and Water Management and Crop Nutrition Laboratory is: a *team leader*, ensuring the efficient and effective management of assigned staff, physical and financial resources in line with quality management standards and a results based approach; a *technical leader*, leading a multidisciplinary team in the Laboratory focused on ensuring the efficient and effective development and implementation of the Laboratory's R&D activities, training and laboratory service as related to the Joint FAO/IAEA programme; and a *technical officer*, evaluating technical cooperation projects (TCPs), and providing technical support to coordinated research projects (CRPs) in the area of soil and water management. Click here for the VA.

6. No-till can increase earthworm populations and rooting depths by W. Doral Kemper, Nicholas N. Schneider, and Thomas R. Sinclair. Journal of soil and water conservation, Jan/Feb 2011—vol. 66, no. 1, 13A-17A (doi:10.2489/jswc.66.1.13A)

Conclusion: Insufficient water is the most common factor limiting crop production. In some areas, irrigation systems can be developed to help relieve that deficiency. However irrigation is a costly input to the production system, and in many areas the water is not available. Most of the water used to fill crop water needs during extended periods between precipitation events is water stored in the soil profiles. The amount of water that a crop can draw from the soil profile is directly dependent on the depth to which that crop's roots penetrate the soil. Long-term no-till management of soils generally increases the depth of crop rooting in soils. Measured increases have ranged from 15% to 36 % in North Dakota soils that were receiving about 40 cm y-1 (16 in yr-1) of precipitation and where an L.t. population had not developed

under the no-till management. In Wisconsin, where precipitation averaged in the 60 to 70 cm y-1 (24 to 28 in yr-1) range, and water table levels were appreciably below freezing levels during the winter, L.t. populations ranged from 10 to 40 m-2 (8 to 33 yd-2) in soils under long-term no-till, and their burrows helped the roots get down 86% to 100% deeper than in adjacent tilled fields. Access to this additional water stored in the soil profile enables crops to continue growth better during drought periods, resulting in better drought-year yields.

Conservation of our resources has been a worthy goal of our society since its inception. However, as global population continues to increase, it is apparent that conservation of our current resources will not be sufficient to enable us to feed future multitudes. Consequently, it is heartening to find that some of our production systems, such as no-till, are able to increase organic matter contents of our soils (Reicosky et al. 1995) and the ability of our crops to use existing precipitation to produce higher yields. Such "enhancement" of our resources will be necessary to provide sufficient food, clothing, and energy to fill the needs of future generations. Click here for the paper.

7. Conservation Agriculture Effects and Policy Support to Mitigate Soil Degradation in Midi-Pyrénés (France) by P. PROSPERI, J. M. TERRES, S. DOUBLET and P. POINTEREAU. land degradation & development (2010) (DOI: 10.1002/ldr.1021)

Abstract: This paper draws on the results of a case study within the SoCo project and aims to assess the benefits and constraints in the application of conservation agriculture (CA) methods in Midi-Pyre´ne´es, France, along with an evaluation of the coherence of the policy framework designed to improve the protection of soil resources. Inappropriate agricultural practices, under particular climate, terrain and soil conditions, have contributed to make erosion the main soil degradation phenomenon in Midi-Pyre´ne´es, particularly under spring crops. The decrease of carbon stock is also a relevant issue. Among the various techniques applied by local farmers to reduce the impact of soil degradation on their land, CA appeared popular and was therefore analysed in detail. No specific legislation on soil protection is currently available in France, while the present agri-environmental policy, including the Rural Development Plan and the cross compliance measures, focuses mainly on water quality and biodiversity. A mixed methodological approach was used consisting of a literature review on the status of soils, of the characteristics of CA practices and of the soil-related policies in force. Semi-structured interviews with selected stakeholders on the use of soil conservation techniques and on soil legislation allowed a broader discussion of the study results. The research suggests that CA can effectively contribute to mitigate soil degradation in Midi-Pyre´ne´es, although some implementation drawbacks seem to limit its wider use mainly due to lack of a specific support. Therefore, a better targeting of existing policies would be desirable for an improved protection of soil resources. Click for document.

8. Evergreen Agriculture: a robust approach to sustainable food security in Africa by Dennis Philip Garrity, Festus K. Akinnifesi, Oluyede C. Ajayi, Sileshi G. Weldesemayat, Jeremias G. Mowo, Antoine Kalinganire, Mahamane Larwanou and Jules Bayala Food Sec. (2010) 2:197–214 (DOI 10.1007/s12571-010-0070-7)

Abstract: Producing more food for a growing population in the coming decades, while at the same time combating poverty and hunger, is a huge challenge facing African agriculture. The

risks that come with climate change make this task more daunting. However, hundreds of thousands of rain fed smallholder farmers in Zambia, Malawi, Niger, and Burkina Faso have been shifting to farming systems that are restoring exhausted soils and are increasing food crop yields, household food security, and incomes. This article reviews these experiences, and their broader implications for African food security, as manifestations of Evergreen Agriculture, a fresh approach to achieving food security and environmental resilience. Evergreen Agriculture is defined as the integration of particular tree species into annual food crop systems. The intercropped trees sustain a green cover on the land throughout the year to maintain vegetative soil cover, bolster nutrient supply through nitrogen fixation and nutrient cycling, generate greater quantities of organic matter in soil surface residues, improve soil structure and water infiltration, increase greater direct production of food, fodder, fuel, fiber and income from products produced by the intercropped trees, enhance carbon storage both above-ground and belowground, and induce more effective conservation of above and below-ground biodiversity. Four national cases are reviewed where farmers are observed to be applying these principles on a major scale. The first case involves the experience of Zambia, where conservation farming programmes include the cultivation of food crops within an agroforest of the fertilizer tree *Faidherbia albida*. The second case is that of the Malawi Agroforestry Food Security Programme, which is integrating fertilizer, fodder, fruit, fuel wood, and timber tree production with food crops on small farms on a national scale. The third case is the dramatic expansion of *Faidherbia albida* agroforests in millet and sorghum production systems throughout Niger via assisted natural regeneration. The fourth case is the development of a unique type of planting pit technology (zai) along with farmer-managed natural regeneration of trees on a substantial scale in Burkina Faso. Lastly, we examine the current outlook for Evergreen Agriculture to be further adapted and scaled-up across the African continent. Click for document.

9. Farming for the Future a Guide to Conservation Agriculture in Zimbabwe. Published by Zimbabwe Conservation Agriculture Task Force, March 2009.

This guide draws together good practice in the field of conservation agriculture, the latest understanding of what works in conservation agriculture and why, and how best to communicate that learning to farmers in Zimbabwe. As well as referring to recent achievements and experiments, the content is based on experiences from many years of implementation and draws on a variety of perspectives held by those working in conservation agriculture. As such, it is a work in progress, and feedback from readers and users of this first edition will be used to inform future editions of the manual and other materials supporting conservation agriculture. This manual is primarily for agricultural extension field officers. It is not intended to cover the subject of conservation agriculture comprehensively but to provide an overview of the principles and practices. The language has been kept simple. The full document is available on the FAO-CA website under training resources.

10. Short-term effects of conservation agriculture on Vertisols under tef (Eragrostis tef (Zucc.) Trotter) in the northern Ethiopian highlands by Tigist Oicha, Wim M. Cornelis, Hubert Verplancke, Jan Nyssen, Bram Govaerts, Mintesinot Behailu, Mitiku Haile and Jozef Deckers. Soil & Tillage Research 106 (2010) 294–302

Abstract: Soil erosion and declining soil quality are the major constraints for crop production and sustainable land management in Ethiopia. A conservation agriculture (CA) experiment was conducted in 2006 at Gumselasa, Northern Ethiopia, on experimental plots established in 2005 on a farmer's field. The objectives of this experiment were to evaluate the short-term changes in soil quality of a Vertisol due to the implementation of conservation agriculture practices and to assess their effect on soil erosion, crop yield and yield components of tef (Eragrostis tef (Zucc.) Trotter). The treatments were permanent bed (PB), terwah (TERW) and conventional tillage (TRAD). Soil organic matter (SOM) was significantly higher in PB (2.49%) compared to TRAD (2.33%) and TERW (2.36%). Although aggregate stability of PB (0.94) was higher than TRAD (0.83), the difference was not significant. PB had larger macroporosity (0.07 m3 mÿ3) compared to the other treatments. PB reduced runoff volume by 50% and TERW by 16% compared to TRAD. PB also reduced soil loss by 86% and TERW by 53% in comparison to TRAD. Despite the above soil physical quality improvements and effectiveness in runoff and soil loss reduction, biomass and plant height of tef were significantly higher in TRAD than PB. The significantly high weed dry matter at first weeding, the types of weeds and their water uptake behavior might have caused the lower tef yield on the PB. We there fore recommend that appropriate rate of herbicides must be used while growing tef using CA practices. Click for document.

11. CARE & Climate Change: Care makes carbon finance work for poor and marginal people

CARE is working to ensure that carbon financed land use and energy activities support poor and marginalized people to reduce poverty, secure their rights, and adapt to climate change, while ensuring environmental integrity. Potential social benefits from carbon finance include new revenue streams flowing to poor communities, and benefits from the more efficient/sustainable land and energy use practices it supports. These "collateral benefits" are particularly significant in the case of improved land use activities where they will, in many cases, far exceed benefits from revenue sharing. Click for document.

12. CONSERVATION AGRICULTURE IN EUROPE: An approach to sustainable crop production by protecting soil and water? Published by SOWAP, Jealott's Hill International Research Centre, Bracknell, Berkshire RG42 6EY

This book represents our "coordinated effort". By reviewing experiences of Conservation Agriculture approaches to crop production, our aim is to present a balanced view of its advantages and limitations, primarily for those concerned with advising on and formulating European policies on environmental protection and agricultural support mechanisms. Click for document.

13. Soil organic carbon and fertility interactions affected by a tillage chronosequence in a Brazilian Oxisol by Joa˜o Carlos de Moraes Sa´, Carlos Clemente Cerri , Rattan Lal, Warren A. Dick, Marisa de Cassia Piccolo and Brigitte Eduardo Feigl. Soil & Tillage Research 104 (2009) 56–64

Abstract: No-till (NT) adoption is an essential tool for development of sustainable agricultural systems, and how NT affects the soil organic C (SOC) dynamics is a key component of these systems. The effect of a plow tillage (PT) and NT age chronosequence on SOC concentration

and interactions with soil fertility were assessed in a variable charge Oxisol, located in the South Center quadrant of Parana´ State, Brazil (50823'W and 24836'S). The chronosequence consisted of the following six sites: (i) native field (NF); (ii) PT of the native field (PNF-1) involving conversion of natural vegetation to cropland; (iii) NT for 10 years (NT-10); (iv) NT for 20 years (NT-20); (v) NT for 22 years (NT-22); and (vi) conventional tillage for 22 years (CT-22) involving PT with one disking after summer harvest and one after winter harvest to 20 cm depth plus two harrow disking. Soil sampleswere collected from five depths (0–2.5; 2.5–5; 5–10; 10–20; and 20–40 cm) and SOC, pH (in H2O and KCl), DpH, potential acidity, exchangeable bases, and cation exchangeable capacity (CEC) were measured. An increase in SOC concentration positively affected the pH, the negative charge and the CEC and negatively impacted potential acidity. Regression analyses indicated a close relationship between the SOC concentration and other parameters measured in this study. The regression fitted between SOC concentration and CEC showed a close relationship. There was an increase in negative charge and CEC with increase in SOC concentration: CEC increased by 0.37 cmolc kg_1 for every g of C kg_1 soil. The ratio of ECEC:SOC was 0.23 cmolc kg_1 for NF and increased to 0.49 cmolc kg_1 for NT-22. The rates of P and K for 0–10 cm depth increased by 9.66 kg ha_1 yr_1 and 17.93 kg ha_1 yr_1, respectively, with NF as a base line. The data presented support the conclusion that long-term NT is a useful strategy for improving fertility of soils with variable charge. Click for document.

14. Stratification ratio of soil organic matter pools as an indicator of carbon sequestration in a tillage chronosequence on a Brazilian Oxisol by Joa˜o Carlos de Moraes Sa´ and Rattan Lal. Soil & Tillage Research 103 (2009) 46–56.

Abstract: Long-term no-tillage (NT) leads to profile stratification of soil organic matter (SOM) pools, and the soil organic carbon (SOC) stratification ratio (SR) is an indicator of soil quality. The objective of this report is to assess the feasibility of using SOC-SR as an index for estimating SOC sequestration in NT soils. The effect of a plow tillage (PT) and NT chronosequence on the SR of SOM pools was assessed in an Oxisol in Southern Brazil (508230Wand 248360S). The chronosequence consisted of six sites: (i) native field (NF); (ii) PT of the native field (PNF-1) involving conversion of natural vegetation to cropland; (iii) NT for 10 years (NT-10); (iv) NT for 20 years (NT-20); (v) NT for 22 years (NT-22); (vi) conventional tillage for 22 years (CT-22). Soil samples were collected from four depths (0–5 cm; 5–10 cm; 10–20 cm; 20–40 cm layer) and soil parameters comprised by SOM pools [i.e., C, N, S, particulate organic C (POC), particulate N (PN), stable C (SC) and stable N (SN), microbial biomass C (MBC) and microbial biomass N (MBN), basal respiration (BR), dissolved organic C (DOC), total polysaccharides (TP) and labile polysaccharides (LP)] were measured. In undisturbed NF soil, the SR of all parameters increased with increase in soil depth. In contrast, the SR decreased in PT, and the SOM was uniformly distributed in the soil profile. All NT treatments restored the SR, and were characterized with higher values of all measured parameters compared to NF. The SR for SOC ranged from 1.12 to 1.51 for CT-22 compared with 1.64–2.61 SR for NT surface and sub-soil layers, respectively. The SR for POC and PN were higher than those for stable C and N. However, SR for the biological pools (e.g., MBC, MBN and BR) were the highest and strongly correlated with the rate of SOC sequestration. An increase in SR of SOC was also positively correlated with the rate and amount of SOC sequestered. Regression analyses indicated a strong correlation between SR of SOC and all parameters monitored in this study. The data showed that the SR of SOC is an efficient indicator of C sequestration in long-term NT management. Click for document.

15. Conservation Agriculture Matters: Practical Guide to Crop and Vegetable Producers by Woda Jeremaih Odok and Mekalilie Benjamin Bol. Centre of Competence for Conservation Agriculture. Malakal – South Sudan. Click for document.

16. No-Till Farming Systems can be translated into any language

The No-Till Farming Systems that WASWAC had published in 2008. If any country wants to translate to any other language, just let WASWAC know and they will cooperate by granting permission without any fee and will furnish original photographs in addition too. The book contains no-tillage experience from about 20 countries. Contact: Dr. Samran Sombatpanit at: sombatpanit@yahoo.com or samran_sombatpanit@yahoo.com

17. Updating CA Data base in AquaStat, FAO

We are updating the CA land area data base displayed in AquaStat (www.fao.org/ag/ca), and we have been contacting our regular sources of information. However, anyone who would like to provide information on the land area under CA systems at the national level would be most welcome. Ideally, we would appreciate receiving the CA area information at the sub-national level, together with any relevant historical information on adoption, cropping pattern, farm size, agro-ecology, constraints, etc.

For the recording pls. adhere to the quantification of the CA definition on the FAO-CA website (http://www.fao.org/ag/ca/6c.html):

1. Minimum Soil Disturbance: Minimum soil disturbance refers to low disturbance no-tillage and direct seeding. The disturbed area must be less than 15 cm wide or less than 25% of the cropped area (whichever is lower). There should be no periodic tillage that disturbs a greater area than the aforementioned limits. Strip tillage is allowed if the disturbed area is less than the set limits.
2. Organic soil cover: Three categories are distinguished: 30-60%, >60-90% and >90% ground cover, measured immediately after the direct seeding operation. Area with less than 30% cover is not considered as CA.
3. Crop rotation/association: Rotation/association should involve at least 3 different crops. However, repetitive wheat or maize cropping is not an exclusion factor for the purpose of this data collection, but rotation/association is recorded where practiced.

We would further like to stress that the database counts actual land area under annual crops with CA (permanent no-till). Area under perennial crops will be recorded separately. No-till area by crop will not be recorded to avoid double recording of the same land area.

Amir Kassam
Moderator
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