

## AGRICULTURAL ENGINEERING UNIT

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### About the Agricultural Engineering Unit

The Agricultural Engineering Unit is a component of Agricultural Support Systems within the Agriculture Group of FAO's Regional Office for Africa. It is concerned with all aspects of farm power, handtools, machinery, equipment and farm structures. Interest is maintained at all technological levels, whether the source of farm power be manual labour, work animals or motorised.

The Unit is involved not only with operational aspects of agricultural equipment but also its service and maintenance, its possible local manufacture and its safety. At national level, the Unit is intimately concerned with the development of sustainable mechanisation systems and to this end, becomes frequently involved in assisting with the formulation of national agricultural mechanisation strategies. Work encompasses all stages of the crop production process from initial land preparation through to the harvest. Particular engineering needs are involved in the development of suitable equipment such as direct drills, sprayers, and knife rollers for crop residue management to enable the application of conservation agriculture systems in Africa.

The Unit has also been involved with the development of education and training programmes, these often concerning rural blacksmiths and artisans and related to local production of handtools, primary processing machinery and equipment for use by some of the many draft animals working in Africa. The field testing and evaluation of alternative mechanised systems is supported in several countries.

The Unit works very closely with the [Agricultural Engineering Technologies Service \(AGST\)](#) based at FAO's Headquarters in Rome and interfaces with many groups of professionals participating in related network exchanges of technical information.

### Projects and Activities

#### 1. Conservation Agriculture

Over the last fifteen years, FAO has promoted interest in the concepts of conservation agriculture as a means to dramatically reduce soil moisture losses, whilst reversing the seemingly incessant processes of soil degradation. Initial activities linked together the efforts of soil specialists and engineers but interventions now are beginning to involve multi-disciplinary teams that not only include natural resource specialist, engineers and agronomists but also social economists, extensionists and many others. Whilst in the year 2003, there may have been some 35 million hectares in Latin America producing crops using techniques of conservation agriculture, a major initiative has now been launched by FAO to make these techniques more widely known with a particular focus being placed on Africa.

RAFA is taking a lead role in these efforts and already projects to create awareness of the techniques are being implemented in Eritrea, Kenya, Tanzania, Uganda, South Africa, Swaziland and Mozambique. Similar activities will shortly be initiated in Ghana and Lesotho whilst several other countries also wish to initiate programmes. Whilst FAO recognises this topic as an intra-professional activity, clearly agricultural mechanisation has a vital role to play as regards the identification, evaluation and production of reliable agricultural equipment allowing the techniques of direct drilling, cover crop management and pest control to be efficiently applied. FAO has now developed a specialist Website on the topic linking to a wide range of both FAO and worldwide information sources, the site also offering access to the Africa Conservation Tillage Network (ACT).



## **2. Agricultural Mechanisation Strategy Formulation**

Agricultural progress and development depends to a large extent on the availability and accessibility of technologies and inputs at farm level. Agricultural mechanization inputs constitute an important part of these. An enabling policy environment is crucial for the private commercial sector to develop and for government institutions to provide adequate services. AGST has developed a number of concepts for the formulation of a National Agricultural Mechanism Strategy and has carried out several projects to give guidance to FAO member states about the role of the public and private sector for the development of the agricultural engineering sector to support agricultural development. African countries that have already undertaken this exercise include Burkina Faso, Ghana, Guinea, Lesotho, Malawi, Mali and Sudan whereas AGST is now working with the Government of Benin to undertake a similar exercise under the **TCP/BEN/3001 "Formulation d'une stratégie nationale de mecanisation agricole"**.

## **3. Pesticide Safety and Spray Application Equipment**

The Interafrican Phytosanitary Council (IAPSC), which is an integral part of the Organization of African Unity, has become increasingly concerned in recent years about the safety and efficiency of the use and application of pesticides in Africa. Without exception, there are instances of pesticide abuse at field level and a general lack of adequate controls in all member states. This is particularly acute in the case of small-scale farmers who use hand carried application equipment but it is also a problem amongst plantation workers whose protection against pesticide intoxication is often neglected.

FAO has already developed a number of publications relating to this subject and implemented a Pilot Project for Pesticide Safety and Spray Application Equipment in Cameroon. The results generated by this are now available to all African countries, including detailed training materials and test facilities for spray application equipment. A number of African countries have already expressed an interest in adopting similar safety measures and the FAO recommended standards for spray application equipment.

## **4. Global Assessment of Farm Power**

The role of farm power in the development of agriculture is well established. The total area under cultivation and the timeliness and efficiency of accomplishing crop husbandry tasks is strongly influenced by the amount of available farm power. The increased usage of farm power creates further demand for related agricultural machinery for harvesting and storage and generates employment opportunities in the agricultural service industry. It is therefore important to seek information concerning available farm power and its application in various agricultural activities (e.g. land preparation, sowing, weeding, spraying, harvesting etc). This information is also of great importance for planning exercises as it influences the design and implementation of future policies.

AGST at FAO continues to the global farm power needs and presented an up-date of its findings in the FAO publication "World Agriculture Towards 2015/30"

"It was estimated in 1997/99, in developing countries as a whole, the proportion of land cultivated by each of the three power sources was broadly similar. Of the total harvested area in developing countries (excluding China), 35% was prepared by hand, 30% by draught animals and 35% by tractors. By 2030, 55% of the harvested area is expected to be tilted by tractors. Hand power will account for approximately 25% of the harvested area and draught animal power (DAP) for approximately 20%. In contrast, humans are and will continue to be the main power source in sub-Saharan Africa. Almost two thirds of the harvested area is prepared by hand at present and although this will fall to 50% by 2030, the physical area involved will remain broadly constant. The area cultivated by draught animals and tractors is expected to increase (both in physical area and proportional terms) but they will not offset the dominance of hand power."

In order to counter this tendency in Africa, the Director General has recently requested the development of a Special Initiative for Mechanisation in Africa and Regional Office for Africa will be closely involved in this work.

## **5. Animal Traction**

Many African countries still rely heavily upon handtool technologies for undertaking crop husbandry activities but as timeliness is crucial for many of these interventions, there are natural limits to the farm size that can be managed successfully using only manual labour. Animal traction has been successfully introduced to many African countries, particularly in the cotton and groundnut production areas where the cash crop promotion has traditionally been supported by

small-farmer oriented credit schemes. There is scope for increased and more efficient use of work animals in several other countries and regions of Africa, particularly where their use remains relatively unknown.

FAO continues supporting the use of draft animal technologies as a complementary source of farm power in some regions, noting that judicious use can contribute to relieving drudgery. The adoption of conservation agriculture production systems can also usefully be combined with the use of work animals.

#### Meetings and Events

21-24 September, 2004 2<sup>nd</sup> International Conference of the West Africa Society of Agricultural Engineering, held at KNUST, Kumasi, Ghana

3-7 October, 2005: 3<sup>rd</sup> World Congress on Conservation Agriculture (IIIWCCA) to be held at Nairobi, Kenya

#### Publications

**Zero tillage development in tropical Brazil - The story of a successful NGO activity.** This is a Case study, John LANSERS, FAO Agricultural Services Bulletin No. 147, FAO, Rome 2001, 57 pp.

**Soil management and conservation for small farms - Strategies and methods of introduction, technologies and equipment.** Experiences from the State of Santa Catarina, Brazil, Valdemar Hercilio de Freitas. FAO Soils Bulletin No. 77, FAO, Rome 2000, 66 pp.

**Conservation of natural resources for sustainable agriculture.** These are Training Modules on a CD, FAO Land and Water Digital Media Series N. 27. FAO, Rome, 2004

**Practical Guide to Use Knapsack Sprayers.** A training and user's manual for lever operated and pressurized knapsack sprayers. Karim HOUMY, January 1999. 67pp, ISBN 9981-9842-6-4. (available in French and an English version is in preparation)

**The FAO Standards for Agricultural Pesticide Sprayers** are also available. The documents consist of 2 Volumes:

AGRICULTURAL PESTICIDE SPRAYERS Volume 1: FAO guidelines on equipment quality control and use and FAO minimum standards. 32pp, ISBN 92-5-104118-0. \$11.00. (also available in French and Spanish.

AGRICULTURAL PESTICIDE SPRAYERS Volume 2: FAO technical standards: sprayer specifications and test procedures. 63pp, ISBN 92-5-104119-9. \$11.00. (also available in French and Spanish.

Two Agricultural Services Bulletins have been published concerning pesticide application equipment, these being technical documents aimed at engineers, technicians and training institutions:

- No. 112/1 Pesticide Application Equipment for Use in Agriculture - Volume 1 Portable Equipment, 1994
- No. 112/2 Volume 2 Mechanically-Powered Equipment, 1995

The Bulletins are available from FAO in English, French and Spanish.

A complete list of other FAO publications relating to Agricultural Engineering is included on the AGSE Website, which is accessible by [clicking here](#).