

Application, Adaptation and Transfer of Zero-Tillage Farming System : Achieved Results

Introduction:

- Following its initiatives for introducing and adapting new farming systems as alternatives to the prevailing traditional systems in the Arab region, AAAID has focused on developing the rain-fed agricultural sector in Sudan and other Arab countries. This is based on AAAID's content of the significant potential role of this sector in developing Arab agriculture, and the fact that it still follows inherited traditional farming techniques and is characterized by low rates of productivity.
- The idea of selecting the new farming system was based on openness, studying all modern international experiments, on-site viewing of practical applications of farming systems in most of the developed world. Accordingly, the zero-tillage farming system was selected, as a means for development, and as an alternative to the prevailing traditional systems. This new system was subjected to a series of experiments, field trials, expanded adaptation, transfer to farmers, and finally, commercial production.
- All of the above mentioned endeavors, which spanned about 5 years of continuous efforts, were successful and would not stop at a certain point or target. It is worthwhile in this regard to outline the achieved results in applying and spreading the zero-tillage farming system.

Investment Application of Zero-Tillage Farming System:

The Site of the Arab Sudanese Blue Nile Agricultural Company/ Sudan:

- AAAID carried out direct supervision of all the stages of the selection, adoption, testing, adaptation, and spreading of zero-tillage farming system in the site of this company over the years 2000 to 2005. The site of this company was the pioneer and nucleus for introducing the zero-tillage farming system for the first time in the Arab region.
- The company applied the zero-tillage farming system in its commercial season for the first time in 2005, after the adaptation and implementation of integrated technology packages for growing each field crop on an area of 15,000 feddans.
- The yields of the crops grown in 2005 increased. The average yield of cotton increased from 150 kg/feddan under the traditional system to 750 kg/feddan under the zero-tillage farming system. The average

yield of sorghum increased from 175 kg/feddan to 1100 kg/feddan, the average yield of sunflower rose from 120 kg/feddan to 519 kg/feddan, and that of sesame increased from 70 kg/feddan to 240 kg/feddan.

- The company achieved a net profit estimated at US\$ 1.4 million in 2005.

- In season 2007/2008 the achieved crop yields were as follows: sunflower 530kg/feddan, maize 970 kg/feddan, and cotton 850 kg/feddan.

The Site of the Pioneers Company for Zero-Tillage Farming / Sudan:

- The company was established in 2005 to apply zero-tillage farming system in Sudan by 38 traditional farmers who had participated in the program for the transfer of zero-tillage farming system in the two seasons 2003 and 2004, which was supervised by AAAID. As a result of the favorable achieved technical and financial results, the mentioned farmers submitted an application to the management of AAAID for establishing the company.

- The Board of Directors of AAAID approved granting the company a loan in the amount of US\$ 487,000 to procure production inputs and agricultural machinery. These farmers were able to apply the zero-tillage farming system on commercial basis for the first time in the season 2005. Sorghum and sesame were grown on an area of 2050 feddans, under direct supervision by AAAID experts to secure proper implementation. The results were favorable and promising. The company intends to prepare for the season 2006.

- Establishing the company is a pioneer model for spreading modern agricultural technologies to small farmers. It reflects the content of farmers, efficiency of implementation, and satisfactory results. This makes it a stable agricultural system which combines, for the first time, between development and investment. Also, one of the factors of its success was that the finance provider and the advisor were one entity, and that the implementation depended on the application of an integrated agricultural package starting from land preparation to harvest.

- In season 2007/2008 the company entered its 3rd year of commercial production and achieved high yields for the cultivated crops which included sorghum, sunflower, sesame and cotton.

An Agricultural Service Company for Spreading Zero-Tillage Farming System in Sudan:

- In response to the interests of the authorities and farmers in most of the states of Sudan, during the year 2005 AAAID prepared a technical and financial feasibility study for establishing an agricultural services company to undertake the spreading and application of the zero-tillage farming system, and proposed 2 branches for the company - one to be located in the Blue Nile State and the other in Gadarif State, as a preliminary stage.
- The idea of the company is based on three main activities : provision of production inputs; agricultural machinery and equipment rental or sale; and, supervision and management of zero-tillage farming projects. AAAID intends to present the idea of the project to the authorities in Sudan, represented in the ministry of finance, the ministry of agriculture, the farmers' union, and the specialized banks, aiming at their contribution and necessary support to bring this investment and development company to reality.

Application of Zero-Tillage Farming System in Farmers Locations in Gadarif State/ Sudan:

- A developmental program was implemented with the objective of applying the zero-tillage farming system in traditional farmers locations in Doka area, Gadarif state, for the second year in season 2005, under direct supervision by AAAID. Ten farmers participated in the program, with 10 feddans for each farmer. The program applied the technology package adapted by AAAID for sorghum and sesame crops. The achieved sesame yield under the new farming system was 320 kg/feddan, compared to 170 kg/feddan under the traditional system. The achieved sorghum yield was 1260 kg/feddan, compared to 350 kg/feddan under the traditional system.
- In 2007 the program was implemented for the third season with the participation of 28 small farmers. The cultivated crops included sorghum and sesame.

Application of the Zero-Tillage Farming System in the State of South Kordofan:

- In response to the requests of the state authorities and farmers, the program was implemented for the first year in Al Dalanj area (Samasim) by participation of 10 farmers on an area of 80 feddans grown with sorghum. Promising results were achieved for the crop, the thing which encouraged farmers and officials in the state to request continuation of expansion in applying the program to include an additional number of small farmers.
- AAAID provided two tractors, two sorghum planters, a sesame planter, and two sprayers, in addition to the providing field logistic support and technical supervision.
- Accordingly, AAAID prepared a plan for expansion in State of South Kordofan, participation of large farmers, and the introduction of observation fields in the site of Habeela, and would be applied on 1120 feddans with the participation of 23 farmers in addition to the 10 farmers who previously participated. This would be in addition of the execution of a support research program and a program for capacity building and training of farmers.

Application of the Zero-Tillage Farming System in the White Nile State:

- In response to the requests of the state authorities and farmers, AAAID implemented a program for the dissemination of the Zero-tillage farming system in Al Megainis area in the state.
- 10 farmers participated in the program on an area of 100 feddans, i.e. 10 feddans per farmer. The results were very encouraging, with achieved yields which out-yielded the traditional system, the thing which encouraged farmers and officials in the state to request AAAID to continue the dissemination of the new farming system.
- Sorghum yield was 9 sacks/ feddan, which was a very advanced yield compared to the yields in the area during the previous years.
- Accordingly, AAAID prepared a plan for growing an additional area of 1100 feddans with sorghum, repeating the experiment with the first 10 farmers by growing sesame crop, introduction of a technology support research program, and the execution of demonstration trials to test the cultivation of promising legume crops. AAAID provided necessary agricultural equipment and technical support.

- The plan included the implementation of extensional programs, capacity building programs, training courses, and introductory pamphlets to small and large farmers.

Dissemination of the Zero – tillage Farming System in Morocco:

- In 2007, implementation of the program for the dissemination of the zero-tillage farming system in Morocco was continued for the 2nd year following the request of the Ministry of Agriculture, Rural Development and Fishing as well as the requests of farmers.
- The program was implemented in 6 locations in Sattat region. It included 92 participants on a total area of 1150 hectares, with a 30% increase in the area, for growing soft wheat, hard wheat, barley, oats, and medical and aromatic crops.
- The program included the implementation of field trials which support the new farming system. They included the performance of locally manufactured zero-tillage sowing machines compared to imported ones, feasibility study for complementary irrigation for wheat crop, production of oats and barley seeds, and the implementation of an agricultural project for soil preservation.
- The program also included the application of GPS and GIS technologies for determining farmers sites and follow up of the daily work program.
- An extensional program for farmers' capacity building was implemented to members of cooperative societies on the sustainable farming system.
- AAAID provided tractors, sprayers, field trucks, and zero-tillage sowing equipment, in addition to providing technical and logistic support in collaboration with the National Institute for Agricultural Research in Morocco, the Agricultural Research Center in Sattat, and cooperative societies.

Dissemination of the Zero – tillage Farming System in Tunisia:

Implementation of the zero-tillage farming system was continued for the second year in farmers locations in the rain-fed areas. The program included the following:

- Participation of 29 farmers on an area of 329 hectares in Salina and Benzert for growing wheat, barley and legume crops.

- AAAID provided tractors, sprayers, zero-tillage sowers, pesticides, weed control materials, in addition to logistic support, in collaboration with the Technical Center for Grains, and the Ministry of Agriculture and Water Resources in Tunisia.
- An increase of 20% in wheat yield was achieved, whereas the quality of grains was high, the thing which indicated the necessity of using the output as seeds and implementing the farming operations in the proper time. This was in addition to the clearly positive environmental impact on soil conservation.
- A research support program and an extensional capacity building program were implemented for training farmers and technicians.
- A field tour was arranged for Tunisian experts to view the original experiment which was adopted by AAAID for introducing and adapting the zero-tillage farming system in Sudan and in different locations.

Trials for the Adaptation and Dissemination of Zero-Tillage Farming Technology in Syria:

- In response to the request of the authorities in the Syrian Arab Republic, and in collaboration with the Scientific Agricultural Research Corporation of the Ministry of Agriculture and Land Reform, AAAID implemented a research program to transfer zero-tillage farming system.
- A wide field experiment was implemented for testing the application of the new farming system by growing rain-fed wheat in the season 2004/2005 in two locations in the 2nd settlement zone in Syria. The experiment depended on comparing between the existing traditional system and the zero-tillage farming system, and the impact of sub-soiling in the two systems. It is worth mention that AAAID supervised the training of a number of Syrian agricultural engineers on the concept of the new system and its applications in the site of the Arab Sudanese Blue Nile Agricultural Company in Sudan.
- A field day was organized to view the results of the experiment, and was attended by H. E. the President of AAAID together with a number of officials, experts, and farmers from Syria as well as from Iraq.
- The results showed superiority of the zero-tillage farming system over the traditional system with significant differences, with or without subsoiling.
- Following the achieved success during the previous three years, the year 2007 witnessed expansion of the dissemination of the zero-tillage farming system to farmers in rain-fed areas in Syria, in Gamshli and Hassaka research stations, with participation of 14 farmers on an area of

28 hectares.

- AAAID provided tractors, zero-tillage planters, carried sprayers, and a field truck, in addition to technical and logistic support.
- A yield increase ranging between 15% and 25% was realized in the wide experiments as well as for the farmers who benefited from the experiment.
- A plan for follow up and supervision of implementing the program was prepared in collaboration with the Scientific Agricultural Research Corporation of the Ministry of Agriculture and Land Reform.
- Efforts are carried on, on the part of AAAID, for continuation and expansion of the program with the participation of more farmers in the rain-fed settlement zones.
- AAAID organized a field tour for experts of the Scientific Agricultural Research Corporation and one of the farmers in Syria to view the experience of AAAID in Sudan with the purpose of exchanging ideas, experiences and achieved results.

Trials for the Transfer and Adaptation of Zero-Tillage Farming Technology in Yemen:

- In response to the request of the officials, and in collaboration with the Ministry of Agriculture in the Republic of Yemen, AAAID implemented a research program for the transfer of zero-tillage farming system.
- AAAID supervised the training of a number of agricultural engineers from Yemen to view the concept and application of the new system on the site of the Arab Sudanese Blue Nile Agricultural Company in Sudan.
- A field experiment was implemented for testing the application of the new system by growing sorghum crop in farmers' locations using mechanical technology packages and modern manual packages for the new technology in two locations: the first location was in Aab, and the second was in Ta'iz province. The experiment was carried out after all the production inputs required for growing the crop were provided, including seeds, fertilizers and machinery, under continuous supervision by AAAID experts.
- The results of the experiment showed relative superiority of the zerotillage farming system. The experiment will be repeated to confirm the results and to introduce new treatments and crops.

Application of the Zero-Tillage farming System in Jordan:

- AAAID implemented a program for the dissemination of the Zero-tillage farming system for the first time in Jordan in season 2007, in collaboration with the National Agricultural Research and Extension Center, of the Ministry of Agriculture.
- A research program was implemented in ArRamtha and Ma'daba stations, growing of observation fields at 15 farmers locations on an area of about 28 hectares with wheat and barley, in addition to the execution of the required extensional program.
- Implementation of the program considered the environmental conditions, particularly scarce rain, the adopted cultivation cycle, and the dominant farming system, by organizing two workshops for introducing the program and the new farming system.
- AAAID provided zero-tillage planters, tractors, and a sprayer, in addition to logistic and technical support.
- The preliminary results were promising, indicating superiority of the Zero-tillage farming system.
- There would be an expansion by 50 hectares in the central area. AAAID would provide the necessary materials and equipment for that.

Training of Cadres to Meet the Expansion in the Application of Zero-Tillage Farming System:

- Due to the importance of training specialized cadres on implementing research, development and investment programs of the zero-tillage farming system in Sudan and other Arab countries, AAAID introduced a program for training in the year 2004 and it continued in 2005.
- Distinguished graduates of Sudanese agricultural colleges were selected for training on the applications of zero-tillage farming system. They were provided with housing and were paid salaries. Some of those trainees were then employed in investment companies, and research and development programs of AAAID.
- This program contributed in providing professional job opportunities and in tying university education with field work.

Studying the Social and Environmental Effects of the Application of Zero-Tillage Farming System:

- In the context of its consideration of corporate social and environmental responsibility of its investment projects, AAAID formed a team of its experts, in collaboration with specialized experts from the University of Northumbria/ Britain, to prepare a framework for supporting the initiatives of AAAID in this regard. The location of the Arab Sudanese Blue Nile Agricultural Company in Agadi/ Sudan was selected for evaluating the social and environmental responsibility of AAAID towards the inhabitants of the neighboring villages to the project which implemented a modern technological agricultural system (zero-tillage farming system).
- Two workshops were organized. The first workshop presented the contents of the application of the new farming system, its dissemination to farmers, determination of the type and nature of the provided social services, and the associated environmental procedures. The second workshop discussed the social aspects of rural development in Sudan, and was organized in collaboration with Ahfad University for Women/ Sudan.
- In the year 2006, a questionnaire will be made and discussion forums will be held for the concerned communities of the villages surrounding the project with the purpose of evaluating the practice and submitting necessary recommendations.

Preparation of a Proposal for the Transfer and Adaptation of Zero-Tillage Farming Technology in Iraq:

AAAID prepared a research and development project for transferring and adapting zero-tillage farming technology in Iraq, with the purpose of studying the possibility of developing the farming systems adopted in the rain-fed sector in north Iraq, in coordination and collaboration with the Iraqi experts of the ministries of agriculture, higher education, scientific research, and science and technology. The Iraqi authorities agreed to the idea and the application of the research project and intend to allocate the necessary financing for the project in coordination with the Arab Commission for Science and Technology.

Preparation of a Document for a Development Project for the Transfer and Adaptation of Zero-Tillage Farming Technology to Arab Countries:

AAAID prepared a development project document for the transfer of zero-tillage farming technology in five Arab countries, namely : Syria, Yemen, Iraq, Morocco, and Jordan. Coordination is being made with regional and international organizations for contributing in supporting this developmental project. There are mutual interests and coordination between AAAID and the Islamic Development Bank (IDB), as well as the International Fund for Agricultural Development (IFAD), for implementing the program in Sudan and other Arab countries. There is also coordination with the ministries of agriculture and other national institutions.