Sustainable Development Projects of the Center for Arid Farming and Conservation Agriculture Research (C.AFCAR)

Project Name: Conservation Agriculture Project (Zero Tillage)

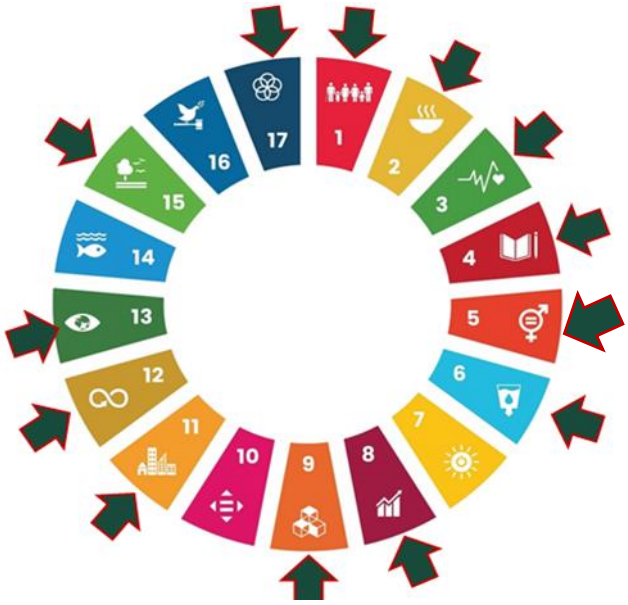
Project Concept:

The climate change affecting Nineveh Governorate and Iraq in general is prompting us to consider a modern, environmentally friendly, and rainwater-harvesting agricultural method. This technology, called Conservation Agriculture, will cover the entire agricultural area in the governorate, which amounts to more than 1.6 million hectares and is divided into 35 agricultural branches.

Center: Center for Arid Farming and Conservation Agriculture Research (C.AFCAR)

Sustainability Goals :

The project achieves 12 Sustainable Development Goals:



Goal 1: No Poverty

Goal 2: Zero hunger

Goal 3: Good health and well-being

Goal 4: Quality education

Goal 6: Clean water and sanitation

Goal 8: Decent work and economic growth

Goal 9: Industry, Innovation, Technology and Infrastructure

Goal 11: Sustainable cities and communities

Goal 12: Responsible consumption and production

Goal 13: Climate action

Goal 15: Life on land

Goal 17: Partnerships for the goals

Funding information: Through ICARDA (formerly ICARDA) and WFP (currently WFP)

The project aims to achieve a complete transformation towards modern agricultural technology, specifically the Conservation Agriculture system, which is based on the principle of no-tillage farming.

The climate change affecting Nineveh Governorate and Iraq in general prompts us to consider a modern, environmentally friendly farming method that is efficient in harvesting rainwater. This technique is embodied in Conservation Agriculture, which will cover the entire agricultural area of the governorate, totaling more than 1.6 million hectares, divided into 35 agricultural divisions.

The project requires the provision of specialized no-tillage seeders for all agricultural divisions, along with tractors to cover this vast area.

The project ensures the achievement of sustainable human, environmental, and economic development, addressing the issues of poverty and desertification, and increasing farmers' income by enhancing rainwater harvesting, thereby boosting yields and financial returns for farmers.

This project is also fully applicable in irrigated lands across all Iraqi governorates and can be extended to all governorates that rely on traditional grain crop farming, which consumes a high amount of fuel for tillage—twice the fuel used in Conservation Agriculture. Furthermore, the amount of water used for irrigating field crops cultivated through traditional methods equals twice the amount required in Conservation Agriculture. This means that adopting Conservation Agriculture would result in significant water savings, allowing the agricultural plan for the cultivated area to be achieved with half the water quota specified for these areas (according to traditional agriculture.(

To implement this project throughout Iraq, the Food Security Budget can be utilized to initiate a comprehensive agricultural revival that would reduce fuel expenditures by half and decrease irrigation water needs by half, in addition to increasing yield. This represents a fundamental solution to the problem of water scarcity across Iraq.The estimated budget for such a strategic project for the entire Nineveh Governorate is approximately 10 million USD, while the budget for the entire country could reach around 150 million USD.

بسم الله الرحمن الرحيم

Differences between Conventional Tillage and Conservation Agriculture

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Features	Conventional Tillage (CT)	Conservation Agriculture (CA)
Soil Fertility	Tillage leads to no accumulation of organic matter in the soil.	CA improves the buildup of organic matter as a result of the annual accumulation of root growth in the soil.
Soil Organisms	CT has eliminated the life of beneficial soil organisms such as earthworms and some beetles that collect organic matter in the soil	CA Preserving the life of soil organisms beneficial to soil fertility.
Rainwater Harvesting	As a result of soil plowing between 1 and 3 times. CT leads to rapid penetration of water into the soil and the inability of the sowing layer to retain water for a sufficient period.	As a result of not plowing the soil at all, CA ensures Rainwater harvesting much more than CT.
Water Consumption:	Excessive tillage makes it difficult for the planting layer to retain water and for it to penetrate deep into the soil, which requires high irrigation rates to the crop.	CA maintains water within the root layer for the longest possible period, and this provides more water for the plant, which makes the need for irrigation decrease to about half.
Sowing Period	As a result of the inevitability of the farmer waiting for the first late heavy rain to fall, often until after November, in order to plow the field to eliminate the weeds and then sowung his field, this makes the sowing period limited to only two months, from November and December.	Sowing under CA can be done very early in the post-harvest period, i.e. from July to December, i.e. the sowing period extends to six months.
Fertilizers	As a result of plowing the soil, CT requires mineral fertilizers in the range of 200-400 kg/ha.	As a result of not plowing the soil and the accumulation of organic matter, the fertilizer dose decreases annually until mineral fertilization stops in the fifth season due to the accumulation of organic matter in it, and then the soil perpetuates itself (sustainable agriculture)
Herbicides	Although farmers use plows to eliminate the weeds, the plows turn the soil and bring out the deep weed seeds to the surface of the soil and germinate, which requires continued control with herbicides .	Herbicides are used for only two seasons in CA, during which the weed problem ends as a result of not plowing the soil. Thus, the use of herbicides ends completely because the fields will be completely free of weeds. (Soil self-sustainability)
Sowing Rate	As a result of the depth of plowing and the irregular sowing depth, the sowing rate in CT is about 200 kg/ha or more.	The sowing rate in CA is 100 kg/ha
Maintenance of tractors and machines.	As a result of the heavy work of the tractors in the field (2-4 passes/season), the tractors need maintenance every year	Regulated use of tractors and machines, with reduce the consumption of spare parts to one- third.

Fuel consumption	**The fuel consumed during the sowing process ranges between 16-32 liters/ha**	**CA consuming only 8 liters/ha.**
Environmental pollution	**The passage of the tractor in the field between 2-4 times consumes (16-32 liters/ha) of fuel to complete plowing and sowing, which leads to severe air pollution with the tug exhaust of Co2 gas and an increase in the greenhouse effect.**	**The sowing process is accomplished with only one pass of the tractor in the field, and the tractor consumes only (8 liters/ha), which reduces air pollution to a minimum.**
Environmental pollution	**Plowing the soil from 1 to 3 plows leads to continuous air erosion of the soil**	**Not plowing the soil and leaving the harvest residues of the previous crop on the surface of the soil in CA reduces or prevents any soil erosion.**
Environmental pollution	**Removing the vegetation cover of the soil from the period after harvest until the next sowing time leads to an increase in the temperature of the soil and a loss of moisture from it**	**Keeping the residues of the previous crop on the surface of the soil and not plowing it leads to cooling the atmosphere, reducing the temperature, and reducing the evaporation of soil water to a minimum as a result of shading the soil and not plowing it.**
Environmental pollution	**High pollution of soil, groundwater and air, as CT depletes large amounts of mineral fertilizers and herbicides.**	**The use of herbicides and mineral fertilizers ends within 2-4 seasons, preserving the safety of the environment.**
The yield and its components	**The yield and test weight of grains are constantly declining as a result of the deterioration of soil fertility, erosion and loss of organic matter**	**The yield and test weight of grains are constantly increasing as a result of the efficient use of water and the sustainability of the soil.**
Economic feasibility	**In CT, the usual economic equation is achieved: maximizing inputs leads to maximizing outputs**	**Economically, the CA has succeeded in achieving an economic equation that is very difficult to achieve, which is: Minimizing inputs leads to maximizing outputs**