**In the Name of GOD**

**Project Number 1**

**Efficient Program of Agricultural Cropping Pattern and Using New Technology in Thi-qar Province, Iraq**

**Introduction**

Where water is limited and soil is vulnerable to erode as similar the situation that Thi-qar being confronted, Efficient cropping systems depend on farm resources, farm enterprises and farm technologies applied including land, labor, water, capital and infrastructure. A set of projections about changing cropping patterns based on replacing traditional and conventional agricultural practices with more environment friendly and tolerant conservation agricultural practices is very necessary.

The objective of this research could be achieved by adopting soil and water conservative technologies. Conservative tillage, super absorbent polymers and controlled production in green houses are examples of these technologies which can be used to help farmers under environmental pressures.

**Cropping Pattern project and it’s developing steps**

Crop cultivation and sowing pattern based on climate, soil properties and water availability have to be evolved for realizing the potential production levels through efficient use of scarce resources. The cropping pattern of Thi-qar farmers should secure conservation agriculture which will be involved with conservation tillage and economical requirement simultaneously. Efficient cropping systems for Thi-qar province depend on farm resources, farm enterprises and farm technologies applied for the farm resources including land, labor, water, capital and infrastructure. This objective could be achieved by adopting soil and water conservative technologies. Conservative tillage, super absorbent polymers and controlled production in green houses are examples of these technologies which can be used to help farmers under environmental pressures. Optimum cropping patterns based on maximizing productivity of the rarest resource or resources will be designed. Intervention actions in agricultural inefficient practices which waste soil and water will be considered. Deficit irrigation in main crops and application of more efficient irrigation systems are solutions which will be investigated.

Demand for both food and energy is quickly rising and will continue to rise with increases in global population and average income. Future trajectories of food prices, food security, and cropland expansion are closely linked to future average crop yields in the agricultural regions of the world. Because the maximum possible yields achieved in farmers’ fields might level off or even decline in many regions over the next few decades, reducing the gap between average and potential yields is critical.

In most major irrigated wheat, rice, and maize systems, yields appear to be at or near 70% of yield potential, with no evidence for yields having exceeded this threshold to date. A fundamental constraint in these systems appears to be uncertainty in growing season weather, thus tools to address this uncertainty would likely reduce gaps. Otherwise, short-term prospects for yield gains in irrigated agriculture appear grim without increased yield potential. "A sustainable agriculture is one that, over the long-term, enhances environmental quality and the resource base on which agriculture depends; provides for basic human food and fiber needs; is economically viable and enhances the quality of life for farmers and society as a whole.

Productivity as an Indicator of Sustainability a farm or agro ecosystem is first and foremost a system of production. A system of production has the goal of converting inputs into desirable outputs. Any definition of agricultural sustainability must ultimately focus on the ability to produce Efficient Agricultural crop yields, Crop cultivation and sowing pattern based on climate, soil properties and water availability have to be evolved for realizing the potential production levels through efficient use of scarce resources.

Average yields in rain-fed systems are commonly 50% or less of yield potential, suggesting ample room for improvement. Although estimation of yield gaps for irrigated regions needs to be Identified. Several priorities such as sustainable and conservation agriculture for future research must be recognized.

The purpose of cropping pattern project study is **Identification and checking the conditions and the feasibility of cropping pattern, sowing techniques, tillage and other New tilling equipment technology, energy consumption, water use efficiency, labor costs, fuel and lubricant needs (like; diesel fuel, oil and solid lubricant,…) instrumentations for control traffic farming (CTF), also precision farming which will be included in GPS and GIS, yield mapping and real time measurements.** Also Study and record all soil structure and soil texture, Electric conductivity (EC), pH, and soil salinity to be indentified and will put them in program to be improved for agricultural crop productions.

Choosing the right equipment and Agricultural machinery for tillage, seeding, spraying and harvesting stages are very important steps to develop and use the new technology and new crop production knowledge. Also, method of organizing and selection statistics plus relating factors to the research objectives will be defined.

In this phase of study, different equipment and crops that might work well and suited to Thi-Qar plain will be identified and the possibility usage of effective brand of machinery and equipment for different consumers will be investigated. The Possibility of the use of agricultural machineries, industrial technologies, and residential areas will be studied. For this purpose, It should be noted that all of the following items will be studied under this phase of project.

1. **Preparing land use/land cover maps of studied areas using GIS.**
2. **Identifying soil characteristics such as texture, structure, penetration resistance and permeability.**
3. **Site selection of stations for making pilots and conservative agricultural crop production**
4. **Water demands and crop pattern for each crop diversity and rotation during each season of the year.**
5. **Optimal pattern of agricultural field and orchard crops**
6. **Irrigation pattern for each area depends on type of crops and water needs**
7. **Sowing patterns and the possibility of using raised bed and permanent bed planting for the main introduced crops**
8. **Investigate of Ridge\_Till and No\_Till planting systems for seeding pattern by reducing water use and economic crop production.**
9. **Feasibility of optimization cropping patterns system**
10. **Crop Rotation maps for all sited area will be developed.**
11. **Introducing cultivated crops, and number of hectares to be covered for each crop**
12. **Preliminary identification of the study area and it’s fertility for different crops**
13. **Required Facility for gathering needed information ad cropping pattern development will be identified**
14. **Identification of environmental characteristics to be related in type of crops and resulted yields**
15. **Identification of available cultivated lands and amount of water needed**
16. **Investigation of land suitable for each specific crops in and around the state**
17. **Identification of types of crops and crop pattern maps for each area of project**
18. **Collecting and Analyzing Data, reports, maps and other information contained of the past time**
19. **Identification of the various crops and varieties under crop rotation program**
20. **Weed control and mechanical equipment for this purpose**
21. **Chemical materials for weed control**
22. **Identification of weed population and recognize annual, biennial and perennial weeds**
23. **Evaluation of sprayers types and related available power**
24. **Calculate the power needs for all cultivating crops**
25. **Identify the tractor types and model plus required Engine horse power (hp)**
26. **Indentify the number of each tractor model related to the work application**
27. **Calculate the ability and usage of tractors for tillage and row crops seeding**
28. **Identify tillage equipment and land tilling strategy**
29. **Tillage and seeding methods for each crop species and calculate the cost for crop establishment**
30. **Select the right type of seeding equipment related to soil and climate condition**
31. **Identify the number of tillage, seeders and other related equipment such as ridgers, furrowers, borders and land levelers, etc………….**
32. **Indentify the forage equipment and machineries related to forage crops for harvesting, drying, baling and handling**
33. **Selecting and calculating the number of hay and forage harvesters for each area**
34. **Identifying the type, model and size of Combine harvesters for different grain harvesting**
35. **Identifying the type and size of other crop and root harvesters depends on the crops**
36. **Determining the location suitable for each main crop**
37. **Preparation of land and area devoted to each crop and rotation techniques**
38. **- Introducing types of crops related to the site conditions and cropping pattern**
39. **Identification of regional environmental conditions and area climate**
40. **Environmental survey and agricultural capacity of the area**
41. **Dividing and devoting some of agricultural land for trees and fruits**
42. **Identify the necessary amount of lands for specific and domestic crops which might be important for the farming**
43. **Identify crop potential and sources of selecting seeds and fertilizers**
44. **Collecting and Analyzing Data, using all available information contained new and old**
45. **Preparation and calculation a technical d scientific reports from all finding through the project study**
46. **Suggesting programs and statistical details required for next steps of the project**
47. **Presenting the final reports for each step of projects, findings and recommendation for next steps**
48. **Preparing the Final reports, covering all conclusions and suggestions**

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