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1. Патологические изменения, обнаруженные в половых органах животных послужили причиной нарушения воспроизводительной способности коров.

2. При нарушении репродуктивной системы коров наибольший процент приходится на эндометриты и составляет 32,8%.

3. Вторая по количеству причина нарушения репродуктивной функции у коров в сельхозформированиях Костанайской области - нарушения функции яичников. На первом месте среди патологии яичников следует выделить образование ПЖТ (31,2%).

4. Различные сочетания патологии половых органов отмечены у 64% обследованных животных.

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IMPROVING THE AGRICULTURAL DECISIONS USING REMOTE SENSING AND LAND OBSERVATION BASED DECISION SUPPORT SYSTEM

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Abstract
The study developed decision support system intended as a guide to practical action such as fertilizing, spraying and irrigation based on the meteorological data, remote sensing data sourced from satellite, ecological data, soil characteristics data, water characteristics data and economic data. The basic component of the agricultural management system were experience of the academicians on fertilizing, pesticide use, irrigation and economic side of production and mathematical algorithms suggested by agricultural scientist. Decision support system included the four different modules such as soil, water, plant protection and economy. It was expected that insurance company, banks, local institutions and farmers’ unions would be common users of the system. Suggested portable decision support system, AGROS, may increase the resource use efficiency and profitability in Turkish agriculture and then update to international level.
Key words: Agricultural management system, fertilizer, pesticide, irrigation, economy

1. INTRODUCTION

Increasing demand to agricultural product due to population increase has create huge pressure on natural resources such as soil and water all over the world, as well as Turkey. Intensive pressure on natural resource led to land degradation and some environmental problems. That is why, sustainability of agricultural production and efficient use of resources has come into the first order into the agenda in many countries. Agricultural sector is still vital sector in Turkey due to its contribution to the total production, gross domestic product, export and employment. Although Turkey is the fifth order in production quantity of all agricultural product among the basic producer, foreign trade performance of Turkey is still unsatisfactory level due to marketing and quality problems. Nowadays, environmental problems related agricultural production arise in Turkey and resource use efficiency and sustainability have priority. Not to obtain accurate technical information related agricultural production on time via effective system is the basic reason behind the problems of product quality and resource use inefficiency (Else and Stavridou, 2015).

Input use recommendations influenced the production quantity and quality have transferred via traditional approach in Turkey, resulting in income loss in both farmers and national level. Still, there have been integrating problems of related data such as meteorological and agricultural practices, resulting in economical loss. Unsuitable climatic conditions, inappropriate agricultural practices such as fertilization, irrigation, storage, plant protection and market conditions have created fluctuation farmers income. It is clear from the upper evidence that designing regional and national level accurate and up to date decision support system is vital needs for sustainable agricultural production (Singh et al., 2008; GWP, 2013).

Traditional techniques and methods are widely used in Turkish agricultural sector. Efficient use of natural resources such as irrigation water and soil have been strongly based on accessing the related information on appropriate irrigation, fertilizing and pesticide application. Developing viable decision support system is the best way to reach resource use efficiency and sustainability (Singh et al., 2008; GWP, 2013). Incorporating experience of the academicians on fertilizing, pesticide use, irrigation and economic side of production with mathematical algorithms via special agricultural management software is necessity for productivity, efficiency and profitability in agricultural sector in Turkey. High cost and labor requirement for collecting the parcel level data made the decision makers follow traditional techniques and approach rather than appropriate techniques when making their decision. Whereas, remote sensing technology is cost effective way to gather data and it has provided very useful data in a short time. Enhancing the resource use efficiency, product quality and profitability in Turkish agriculture sector, the study has aimed to develop decision support system based on data come from remote sensing and land observation and incorporate experience of academicians with mathematical algorithms on special portable software.

2. METHODOLOGY

Decision support system was developed by using first of all the data belong to Merzifon district of Amasya in Turkey. Then its scale promoted to regional level and national level, respectively. Research data were obtained from satellite, farmers and related institutions. Results of the past soil analysis constituted the main data base for parcel level soil characteristics. Soil data base included the at least 5 thousand soil analysis for each district. In order to integrate the satellite (Landsat 8) data to the parcel level data, data were collected from farmers by using the well-designed questionnaire and from measurement by using suitable instruments at the selected parcel, which was represented the local area. Market characteristics such as price of agricultural product and input prices were also used in the study.

2.1. Structure of the decision support system

The basic structure of a decision support system, AGROS, was depicted in Figure 1. When decision making unit face with a practical real world problem, which is unsolvable based on its experience and judgement alone, suggested DSS, was best option for decision makers. AGROS consists of three main parts such as basic data, application modules (soil, plant, water, plant protection and economy) and program outputs. Some of the basic data were included into the software, while the other data entry would be updated dynamically by users. Application modules include the necessary scientific and engineering mathematical algorithms. System outputs are harmonious with the users’ preferences and meet the requirements of local, regional or national level authority.
2.2 Water management module

The main target of the water management module contribute the yield and quality of the agricultural crops and increase irrigation water use efficiency. It is based on the characteristics of plant, soil, meteorological variables and parcel level information. In addition, water module use the satellite data for irrigation system management. The basic output of the module are crop basis water consumption, irrigation water needs, irrigation programs under different irrigation system such as drip, sprinkler etc. Data entry interface and user panel of water management module are depicted in Figure 2-4. (FAO, 1994)
2.3. Fertilizing management module

The fertilizing management module is based on the national level data and its fertilizing recommendations harmonious with the FAO approaches. The fertilizing management module prepare the fertilizing recommendation based on the results of past soil and plant analysis or soil parameters that users enter the system and reports fertilizing program. This module is also used the results of plant analysis, data related water management, meteorological data and geometric and topographic characteristics of parcel. The outputs of the fertilizing management module are capacity of soil productivity, form and quantity of fertilizer, time and style of fertilizer application and recommendation for soil problems. Data entry interface and user panel of soil characteristics are depicted in Figure 5-7. Table 8 and 9 presents the plant analysis preface and output of plant analysis (FAO, 2003, 2006a,b, 2008).
Plant protection module works based on the plant and meteorological data. Plant data base of the system includes the data such as characteristics of plant disease and insects and plant protection product against disease and insects. After selecting the crop, disease or insect is entered together with symptoms to the system. Then system reports the recommendation. Diagnosing the disease or insects, measures against disease and insects, time and dose recommendation, and determination of time between application time and harvest are the basic outputs of the module (Tosun and Onan, 2014; Anonynmous 2016).

2.5. Economy module
The inputs of the economy model are basic farm characteristics (farmland, labor, capital etc.), parcel based input use (seed, fertilizer, chemical etc.), parcel based output (production, yield etc.), input and output market characteristics (input prices, output prices, marketing type etc.) and yield estimation based on time series and satellite. This module includes the mathematical algorithms such as economic analysis, simplex algorithm, partial budget analysis and risk analysis. Economy models reports the cropping pattern for maximum profit, breakeven price and yield, production cost for farm managers, insurance company and other common users. In addition, system support the decision maker to decide economic feasibility of the new or regeneration investment (Singh et al., 2008).

3. CONCLUSION
The suggested DSS, AGROS, will help the farmers to make effective management decision and to increase their productivity by raising the yield of cash crops and to enhance their economic viability. This system provide the all type of information related to crops to the farmers. Applications that are successfully developed using the database of the DSS are plant nutrition, plant protection, water and breakeven yield and
price. If AGROS was implemented at village, district and national level, the model would provide valuable information to producers’ union, bank and insurance company.

With growing population and demands for improved farm management, there is requirement to implement sustainable resource use that best serves the communities and the nation. To satisfy this need, the DSS is developed to aid decision-makers and various stakeholders in identifying and assessing options for resource uses. The DSS applies an integrative approach, combining biophysical data, perceptions and socioeconomic conditions of the farmers for selected area. AGROS with all the ready information help the farmers in a very useful manner. The farmers can get all the information via computer.

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IMPORTANT WHEAT PESTS IN TURKEY

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Wheat is produced in 35% of the common cultivated area of Turkey. One of the most important problems causing the production loss and affect the quality of the wheat is the pests. Although it varies annually based on the region, Eurygaster spp., Aelia spp., Aphids, Zabrus spp. and Anisoplia spp. are considered the most important pests in wheat production.

Key words: Wheat, Pests, Turkey