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AgroNutri Android Application

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Abstract: Agriculture is the backbone of India. Farmers need advice to take decision during their farming activities such as land preparation, sowing, irrigation management, fertilizer management, pest management and storage for higher production of crop. Application of required amount of fertilizer at proper time and proper proportion will help in increasing the overall productivity of the farm and also safe guards the soil health and microbial biodiversity. Growing trends in Agricultural Automation has led to a tremendous development of software and applications to foster information dissemination. This paper expresses the idea about the creation of AgroNutri an android application that helps in delivering the crop specific fertilizer quantity to be applied. The idea is to calculate the amount of NPK fertilizers to be applied based on the blanket recommendation of the crop of interest. This application works based on the crop selected by the farmer and that is taken as input, thus providing the farmers with the blanket recommendation of the NPK fertilizers and the amount of Urea, SSP and MOP to be applied.

Keywords: Blanket Recommendation, Urea, SSP, MOP, Agricultural Automation, Soil Nutrient, NPK.

INTRODUCTION

The agriculture industry relies heavily on the use of NPK fertilizer. There are numerous building blocks of life that plants need for healthy growth. Soils often lack these elements, either naturally, or as a result of over cultivation, and needs to have these building blocks put back into it in the form of fertilizers.
NPK fertilizer is primarily composed of three main elements:

- Nitrogen (N), Phosphorus (P), and Potassium (K), each of these being essential in plant nutrition. Among other benefits, Nitrogen helps plants grow quickly, while also increasing the production of seed and fruit, and bettering the quality of leaf and forage crops. Nitrogen is also a component of chlorophyll, the substance that gives plants their green color, and also aids in photosynthesis.
- Phosphorus, also a key player in the photosynthesis process, plays a vital role in a variety of the things needed by plants. Phosphorus supports the formation of oils, sugars, and starches. The transformation of solar energy into chemical energy is also aided by phosphorus, as well as in development of the plant, and the ability to withstand stress. Additionally, phosphorus encourages the growth of roots, and promotes blooming.
- Potassium, the third essential nutrient plants demand, assists in photosynthesis, fruit quality, the building of protein, and the reduction of disease.

The amount of nutrient available to the plant from the applied amount of fertilizers is usually left neglected and fertilizers are either over applied or not sufficiently applied. AgroNutri app is developed to compute the plant available amount of nutrient from the fertilizers to be applied. This helps the farmers to protect the loss incurred due to the over or under application of fertilizer.

REVIEW OF LITERATURE

1. **Maha-Farm**:
An android application which would include Agro based crop information, Weather updates, Daily market prices and news/loan informational updates [1].

2. **Android Application for Agriculture Decision Support System:**
Using this application farmer can cultivate more suited crop and increase production ratio. The application needs basic inputs like water availability in mm, average temperature , average soil pH of farm, locality of farm, soil type etc., by certain calculation at backend this application will show most probable crops for that farm [2].

3. **FarmManager**
The management of small farms, designed and developed to respond to the needs and Characteristics of farmers of Greek. It can store database, do farm customization, easy field management, land field data, easy job recording process, employees and equipment [3].

4. **AgroMobile**
Developed especially for the Indian farmers to assist them in agricultural needs. It is used for botanical species recognition and disease detection using a simple mobile phone with camera [4].

5. **E-agree**
Used to detect detects leaf diseases. Also provides online market place, market rate guide, weather report and soil information to the farmer [5].

6. **Agriculture Supply Chain Management**
The complete package for farmers to do farming on sugarcane and obtain good production with proper management [6].

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7. **Scheduling, Controlling and Monitoring of Agricultural Devices**
Used to farmer in controlling the motor and pesticides proportion, monitoring the farming activities going on in the farm remotely and also allow for improving the efficiency of the irrigation process [7].

8. **Solution for farmer consumer interaction**
Provide information to the farmers about how to get access to better inputs and gain more productivity; get connected to the end consumers. Also give information like the activities he should perform right from the time when the seed germinates till the day when the crop is ready to be harvested [8].

DESIGN OF AGRONUTRI APPLICATION

A. Input
AgroNutri application has an in-app database of major crops categorized as cereals, pulses, fibre crops, plantation crops etc. These crops are listed in a combo box from which the user could select the crop of interest. This selection is taken as input from the user and further analysis is preceded. The diagrammatic representation of AgroNutri is shown in fig 1.

AgroNutri App Algorithm

Step 1 Get the input –crop of interest from the user.

Step 2: Retrieve the blanket recommendation of the selected crop from the in-app database which is represented in Fig 2.

Step 3: Display the blanket recommendation ratio of nitrogen, phosphorus and potassium.

Step 4: Calculate the amount of urea for nitrogenous fertilizer from the recommendation ratio using the formulae **Nitrogen ratio*2.17.**

Step 5: Calculate the amount of Single super phosphate for phosphorus fertilizer from the recommendation ratio using the formulae **phosphorus ratio*6.25.**

Step 6: Calculate the amount of Muriate of Potash for potassium fertilizer from the recommendation ratio using the formulae **potassium*1.67.**

Step 7: These calculations give the amount of fertilizer to be applied at the rate of kilograms/hectare.

Step 8: These results are then displayed on the application screen.

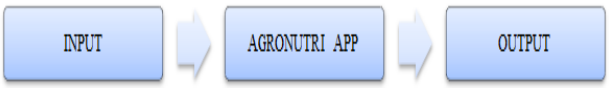

Fig. 1. Diagrammatic representation of AgroNutri App

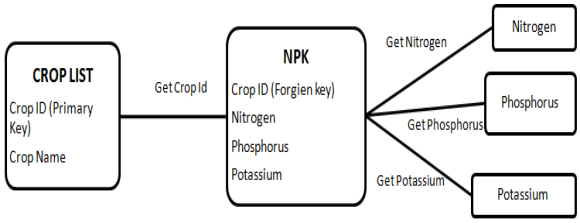

Fig2. Diagrammatic representation of Data Flow Output

The output of the application is the amount of fertilizer to be applied to the specified crop at the rate of kilograms/hectare. The output data is categorized in the form of displaying the amount of urea for nitrogen, single super phosphate for phosphorus and Muriate of Potash for potassium which is shown in Fig 3 and Fig 4.

Experimental Results
AgroNutri app was implemented using android operating system with KitKat as target version and Froyo 2.2 as minimum operating system requirement.

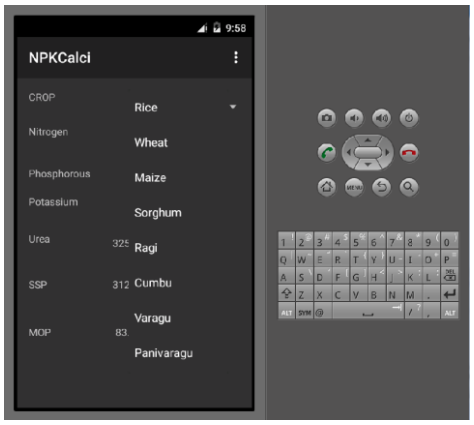

Fig. 1. Screen shot of user interaction

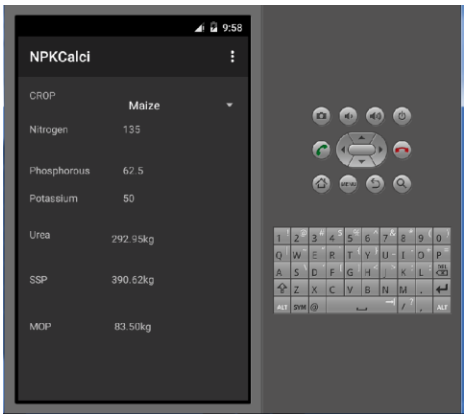

Fig. 4. Screen shot of Nutrient Recommendation

AgroNutri is an android application that provides its user with the crop specific nutrient requirement and amount of fertilizer to be applied. AgroNutri features an inbuilt database of major crops cultivated across the country. The user starts interacting with the AgroNutri by selecting the crop name for which the blanket recommendation ratio of major nutrients like Nitrogen, Potassium and Phosphorus for the selected crop is displayed. This ratio of Nitrogen,

Phosphorus and Potassium are then taken for computing the amount of Urea, Single Super Phosphate and Muriate of Potash to be applied for the crop at the rate of kilogram per hectare. Once computed these values are displayed from which user can get the information about the amount of fertilizer that has to applied for his cultivated land.

CONCLUSION

AgroNutri app helps in delivering the crop specific fertilizer quantity to be applied for the cropped area, this helps the farmers to reduce the cost incurred for them in over application of fertilizer. Further the productivity of the farm is increased by application of appropriate proportion of major nutrients. The future scope of the AgroNutri is that GPRS can be included such that the location specific nutrient recommendation can be given for the crop. Further this app would be incorporated as a part of the precision agriculture wherein sensors can be used to find the amount of NPK present in the soil and that amount can be deducted from the recommendation thus providing us with the precise amount of nutrients to be applied.

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BIOGRAPHY

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Dr. M. Kalpana obtained her B.Sc Degree (Statistics) in 2001. She is a rank holder in under graduate degree. She obtained her M.C.A degree from Maharaja College for women in 2004 and M.Phil in Computer Science at Madurai Kamaraj University and her Ph.D in Computer Science in Bharathiar University during 2014. She has to her credit three books, 4 papers in National Conference and 2 paper in International Conference, 11 papers in International Journals and two book chapters in IGI Global,U.S.A. She has also coordinated for the training offered by National Horticultural Mission (NHM) to the State Agricultural and Horticultural officers and prepared manuals. She is a Life member of International Association of Engineers (IAENG), International Association of Computer Science and Information Technology (IACSIT) and member of Internet Society (ISOC). She has been awarded Bharat Jyothi Award from India International Friendship Society.