**Success story under RKVY Project Implemented at UAS, Raichur**

**SUCCESS STORY-X**

# Precision Farming Techniques in Selected Field Crops

**1. Title :** **"Precision Farming Techniques in Selected Field Crops"**

**2. Category :** Agriculture -Food grain production

**3. Challenge:** The soil is heterogonous mass. Its properties and thus its soil fertility varies spatially within a given unit area and it has influence on crop performance and yield. This variation is very much significant when comparison between soils of different farmers. Therefore, the quantum of application of inputs cannot be generalized and thus crop performance varies even with the standard rate of input use among farmers. This issue of soil variability can be addressed through soil test based input application and can achieve a given target yield in respective soil types provided soil fertility is the main constraint and limiting the crop yield in that concerned area.

This subject matter is challenging to both scientists and farmers. Farmers generally follow their indigenous method of input application i.e. blanket application of fertilizers which doesn't have any scientific basis. On the other hand, scientist who use recommended dose of fertilizers for specific crop but are mostly generalized rates and are usually equated to medium fertility ratings of soils. Therefore, both the practices or approaches are not precise as they do not account the native soil fertility and also the other factors including the expected or targeted yield in other words nutrient required in kilograms to produce every quintal of yield from unit land. This challenge can be encountered by adopting some components of precision farming techniques by giving more emphasis to the soil test based nutrient application to optimize soil input application for higher crop yields. The application of input fertilizers based on soil test and crop nutrient requirement ensures the optimization of fertilizer applications in different soil types for different crops. This overcomes the chances of soils with high fertility receiving higher quantum of fertilizer which may be more than the crop requirement, one can save the cost on fertilizers and vice versa. In a long term this may lead to economically and environmentally viable practice more particularly in regions of high intensive agriculture.

**4. Initiative:** To address the challenge and to have better understanding of the components of precision farming techniques large scale demonstrations at farmers' fields and experimental trials were initiated at research stations coming under UAS Raichur jurisdiction.

**Implementation of strategy & approximate timeline:**

1. Orientation of faculty and staff about the concept of precision agriculture: 03 months and it is continued as and when required
2. Procurement of tools and necessary software for the interpretation of results: 06 months to 12 months.
3. Laboratory facility to take up analysis of large number of soil samples: 06 months through collaboration with soil science department of UAS Raichur
4. Selection of proactive farmers who can cooperate with trials and demonstrations: 03-06 months
5. Initiation of experiments with planned activities and monitoring:06 months at each locations

**Following are the steps taken to implement the strategies:**

1. Recruitment of skilled and committed manpower to successfully implement the objectives
2. Timely selection of farmers and collection of representative soil samples from the selected fields
3. Timely analysis of soil samples, calculation of fertilizer inputs required and its procurement
4. Collection of good planting materials and preparation of fields
5. Initiation and execution of field experiments with standard agronomic practices
6. Monitoring of experimental fields and collection of yield data

This initiative involved the scientists of various disciplines and farmers from different villages and also science graduates through integration of expertise knowledge in different components. The project started in the year 2011-12 and concluded in 2015-16 and it benefitted many research fellows, post graduate students, various farmers from different villages. A total outlay of Rs. 210.0 lakhs expenditure has been spent during the course of implementation.

**5. Key results:** The key results/insights/interesting facts can be summarized as below:

1. Soil test values indicated a marginal to medium fertility variations within a field. Therefore, one acre field can be used as one unit instead of dividing into small grid areas.
2. In general, the results have indicated that there was an increase in yield by 15-20% in cotton, 20-25% in paddy and 15-25% in pigeon pea over the farmers' method and moreover there was also significant reduction in the amount of fertilizer input consumption by 10 - 15% in cotton and 25-30% in paddy when compared to the farmers' method of fertilizer application.

**6. Impact:** The impact of the above initiative in other words success or failure of the technology is measured based on the cost : benefit factor, change in crop yield, change in quantum of input application etc.

General assessment about the crops, crop yield, quantity of input application, plant cultivation costs etc. were made at before and after the implementation of technology. General surveys, samples, photographs etc. were taken as evidence for the assessment of technology. However, the overall adoption and practice depends on farmers' perception about the technology. Although, the adoption of soil test based input application can benefit farmers more particularly in irrigation commands where intensive farming is in practice, farmers have reservation to shifting from conventional farming to this new practice.

During the interaction with the beneficiary farmers it was found that farmers' have certain worries about the huge cost involved in soil sampling and analysis, which is tedious and time consuming.

**7. Lesson learned:**

1. Soil fertility is highly variable both spatially and temporally in a given field. Therefore, it requires assessment of soil fertility after every crop most particularly in irrigation commands through soil sampling and analysis which is more tedious and time consuming and also expensive. Huge number of soil samples are generated if we go for grid based method of soil sampling as per the principles of precision farming techniques. Moreover, choosing the appropriate STCR equations to estimate the precise of quantity of fertilizer inputs is also not stimulating and tedious.
2. The above challenge is countered by collecting one composite sample per one acre of area. Each acre of area is treated as one grid and thus number of soil samples reduced from 5 to 1 per acre at each farmers field.
3. However, the above challenges can be met first by restricting the number of soil samples per unit area based on the topographical features and previous management practices adopted by farmers. Moreover, the tedious STCR equations can be replaced by simple method of adjusting the general fertilizer recommendations of crops to soil test ratings, which is simples and time saving. Farmers' can also be made well acquainted with this method.

**Still followings are the main constraints:**

- Precision agriculture practice involves more modern and advanced tools, their use is not easy and often complicated
- Involves huge cost on soil sampling and analysis, which is tedious and time consuming
- Precision agriculture is not economically viable in Indian context owing to small, marginal and fragmented land holdings, which invalidate the benefits of higher crop return and savings on fertilizer inputs.
- Moreover, most of the precision agriculture tools and techniques are yet to be standardized for better adoptability even in developed nations with large land holdings.

**8. Supporting Quotes & Images:**

"This initiative made us to understand that there is no need to use excess or more quantity of fertilizers which is not necessary. Before, this we used to use more fertilizers depending upon the economic condition of farmers. Now we learnt that by using less fertilizers also one can get similar yield. But the fact is that using right quantity of fertilizers saved us money not only on fertilizers but we also had less pest infections and the problem of cotton leaf reddening was minimum when we used calculated quantity of fertilizers as pert the instruction of field supervisors. Demonstration was taken in about 100 acres of fields of various farmers for 03 years. All the farmers are convinced that balanced and timely application of fertilizers can fetch us higher returns"

**Mr. Yellareddy, Cotton Farmer,**
**Village: Merchatal,**
**Taluk: Raichur, Karnataka**

"The demonstration of precision farming techniques on paddy crop on an area of 100 acres of fields of various farmers in our village has indicated the benefits of using the fertilizers based on soil testing. We are cultivating paddy since from many years using high amounts of fertilizers based on our own knowledge experience. But when this demonstration was initiated, the soil testing have shown that our soils have higher available Phosphorous and Potassium contents. Therefore, the demonstration plots received much lesser quantity of P and K fertilizers than what we used to apply and still we have got equivalent yield of high fertilizer applications. Now we realized that, by applying the right amount of fertilizers we can get more profit due to higher yield, less insect pest attack. Now many of us decided to reduce the quantity of fertilizers by 25% to 50% than what we used to apply"

**Mr. Ramakrishna, Paddy Farmer,**
**Village: Jangamara Kalgudi, Taluk: Gangavathi,**
**Koppal, Karnataka**

**9. Additional information:**

Contact details of farmers' representatives of villages where demonstrations were initiated
Mr. Yellareddy, Village: Merchatal, Raichur, Karnataka Mob: 9611491149
Mr. Ramakrishna, Village: Jangamara Kalgudi, Karnataka Mob: 9448133985

**10. Check list**

| No. | Question to consider | Yes | No |
|---|---|---|---|
| 1 | Is the story interesting to the target audience of the project/activity report? | | **No** |
| 2 | Does the story explain what new insights the project brings? What is the main lesson learned from this story? Does the story describe a key insight on what works and what doesn't and something that future project could build on | **Yes** | |
| 3 | Does the story describe the outcomes the project produced and the people who are benefitting? What changes–in skills, knowledge, attitude, practice, or policy–has the project brought, and who is benefitting from these changes? | | **No** |
| 4 | Does the story make a compelling point that people will remember? Does the story show how the project makes a difference to improving livelihoods and lessening poverty? | | **No** |
| 5 | Does the story provide an interesting fact that people will remember? For example, how much yields increased, how many hectares of land could become more productive from this innovation or technology? | | **No** |
| 6 | Does the story explain what kind of impact this innovation or technology could have if scaled up? | | **No** |
| 7 | Does the story show which partners contributed and how? | | **No** |
| 8 | Does the story include quotes from Stackeholders or beneficiaries? | **Yes** | |
| 9 | Have I provided links to other media (journal articles, website news, newsletter, blogs, annual reports of other Programme/ project ) that also feature this story? | | **No** |
| 10 | Have I provided the contact details of people who can provide more information? | **Yes** | |

**7. Contact person for this story (name, position, email address)**

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