SOIL TESTING PROGRAM

Details of the Present Proposal:-

Soil organic carbon level land Acidic & Alkaline estimation as a key issue in efforts to increase agricultural productivity and production since optimal use of nutrients, based on soil analysis can improve crop productivity and minimize wastage of these nutrients, thus minimizing impact on environmental leading to bias through optimal production.

An effective linkage between soil estimation and soil survey is useful to ensure formulation of a sound soil fertility evaluation programme. Ayushman foundation set up, soil survey is generally kept under the discipline of natural resource management while soil testing remains a part of the discipline of *fertilizer use and management.*

Vision:-

This project may help in developing public awareness for soil and water conservation. For successful conservation of water it is necessary to increase the knowledge of water resources anduse. On the other hand, sustainable crop production requires the constant monitoring of the soil pH. This project may help in examining the level of pH in soil and also the level of TDS and pH in water with a proper guidance of how to get rid of this problem

1. Background of the Project:-

Soil and Water are the main elements of human life, Drinking of polluted water along with poor sanitation and hygiene are themain contributors to an estimated 4 billion case of diarrhoeal disease annually, Soil is a thin layer of earth's crust and is a living media, which is one of the important factors of crop production and serves as a natural nutrient source for the growth of plants. The components of the soils are mineral material, organic matter, water and air, the proportions of which vary and which together form a system for plant growth.

Sick soil is a major constraint in the development of farmers. It also hinders the economic growth. Considerably high or low pH alters the soil's physical, chemical, and biological properties and affects plant growth. During our survey, it has been found that soil pH between 6.8-7.5 is ideal for optimum crop productivity. Therefore, our organization has decided to check the pH and organic carbon in soil.

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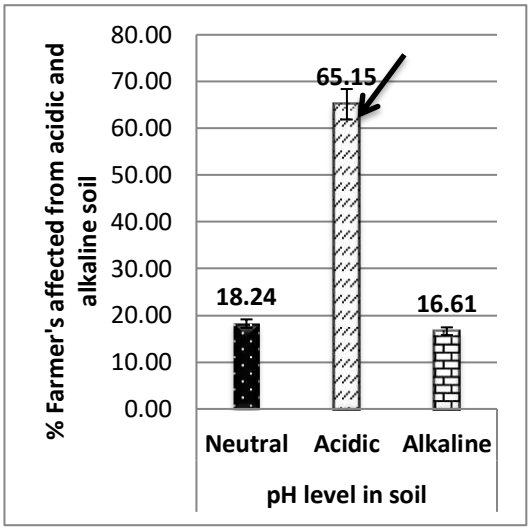
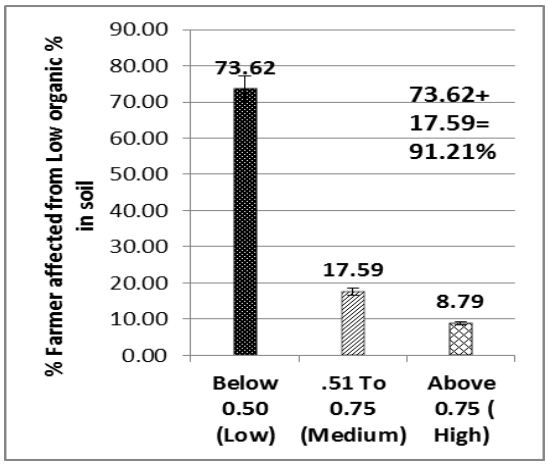


Soil pH

Fig no:-1***pH estimationof 307 soil sample we found 65.15% farmer's Acidic soil 16.61% farmer's Alkaline soil and 18.24% farmer's soil between 6.5 to 7.5 pH soil.(ResourceAyushman foundation trial 2016-17)***This data clear show that 81.76% ***farmer's soil sickness.*** The pH scale range from 0 to 14 ; a pH of 7 is considered is neutral. If pH values are greater than 7, the solution is considered basic or alkaline; if they are below 7, the solution is acidic. It is important to recognize that because the pH scale is in logarithmic unit ,a change of just a few pH units can induce significant changes in the chemical environment and sensitive biological processes. For example , a soil with pH 5 is 10 or 100 times more acidic than a soil with pH 6 or 7 respectively.



Organic carbon in Soil Organic Carbon in soil is one of the most important constituents of the soil due to its capacity to affect plant growth as both a source of energy and a trigger for nutrient availability through mineralization. Soil organic carbon fractions in the active pool, previously described, are the main source of energy and nutrients for soil microorganisms. Humus participates in aggregate stability, and nutrient and water holding capacity.

Fig No:- 2. ***After 307 soil test we found that 73.62%farmer's below 0.50% and 17.59% farmer's soil below 0.75 (medium OrganicCarbon%) and 8.79 % farmer's soil sample more than 0.75% organic carbon .***This data clear show that 91.21% farmer's needed organic manure in their soil and alos these farmer does no actual status of their soil. such as polysaccharides (sugars) bind mineral particles together into microaggregates. Glomalin, a SOM substance that may account for 20% of soil carbon, glues aggregates together and stabilizes soil structure making soil resistant to erosion, but porous enough to allow air, water and plant roots to move through the soil. Organic acids (e.g., oxalic acid), commonly released from decomposing organic residues and manures, prevents phosphorus fixation by clay minerals and improve its plant availability, especially in subtropical and tropical soils. An increase in SOM, and therefore total C, leads to greater biological diversity in the soil, thus increasing biological control of plant diseases and pests. Data also reveals that interaction between dissolved OC released from manure with pesticides may increase or decrease pesticide movement through soil into groundwater.

5.2 Objective of the project.

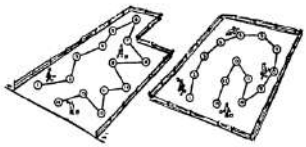
The main objective of this project is to increase the knowledge and awareness among the farmers in order to enhance the production of various crops. This mission includes informing the farmers about the actual status of organic carbon and pH level in the soil using **soil testing** kit or **walkley-Black chromic acid wet oxidation method** and cluster demonstration of rice, maize, pulses for improved packaging. The social economy of Katihar is mainly dependent on agriculture. The industry here is mainly agro based. The main economically important crops of katihar are banana, makhana, jute, maize, rice. The organic matter status of soil in Katihar has been found to be deteriorating year by year, which is a major obstacle for sustainable agricultural production.According to our observation soil pH in most of the fields of katiharvariedbetween 4.7-5.7. Without basic level of soil test for organic carbon and pH it is impossible to increase the production. For new entrepreneurship and job opportunity in agriculture our organization has decided to test the soil regularly for at least 2 times – once before treatment and another after treatment to ensure that the soil remains healthy and productive maximizing the benefits of farmers. This project will help in balanced fertilization through soil test based fertilizer recommendation and reclamation of problematic soils.

Water quality testing is important for a number of reasons such as checking for contaminants, improving odor and taste also to classify your water as pure, hard and soft. There are two important water quality testing criteria that can determine the safety and purity of your water.

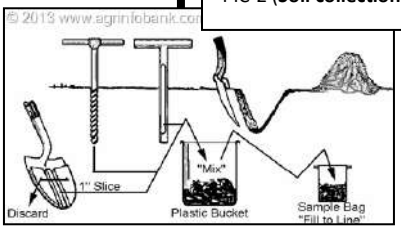
5.3 Operational Plan :-

Exhibits, Conferences, Workshops, and Presentations.
●Displays●Brochures.●Posters
●Target Audience.●Pitching your story.

PIC-1(**Plot law out**)



PIC-2 (**Soil collection formfield**)



PIC-3 (Crussing fine powder of soil)

PIC-4(Identity of soil name&Add)

PIC-5 (Ready for soil test)

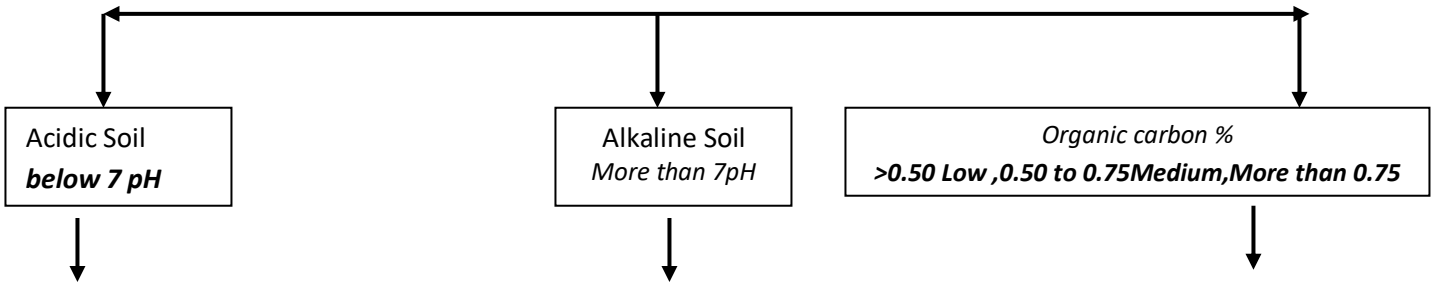
PIC-6 (Soil test)

PIC-7 (After soil test Discuss with ourteam)

PIC-8(After soil test Disciuss with farmer's)

PIC-9(CertificateDistributing)

Solution to Soil Problem



●Soil treatment can ameliorated and the pH of the soil increased by the addition of lime/limestone (calcium carbonate) and similar compound that have been ground fine for use.	●It is important to note that addition of phosphate fertilizer alone will further reduce the availability of other nutrients.	Provide best quality of organic manure not less than 10% organic carbon.
●Types of lime like amendments include: ●Lime is most effective at neutralize acidity when it is incorporated/tiller into the soil to (as per recommend dose in soil certificate) . ●Dolomite limestone ● Quicklime ●Hydrate lime ● Marl ● Chalk ● Oyster shell ● Wood ashes ● Fluid lime	●Elemental sulfur can be added to soil as it forms sulfuric acid when it reacts with water and oxygen matter in the presence of sulfur oxidizing bacteria Iron and aluminum compounds can added to soil as they cause the release of hydrogen when they react with water.	The vermi compost made by the farmer will be advised to use that organic manure if their oc % more than 6.
	●Additions of appreciable amounts of organic matter will help to acidify the soil as microbes decompose the material releasing co2 with then form carbonic acid. Organic acid are also released during humus decomposition. Peat and peat moss are highly acidic form of organic matter but can be costly.	Slurry is the best organic manure because their organic % is more than 18.
	●Application of acidifying fertilizer such as ammonium sulfate, can help lower soil pH. Ammonium is nitrified by soil bacteria into nitrate and hydrogen ions.	How to decompose kitchen waste and use as a organic manure.
	●Sodic soils contain so much sodium that the soils become dispersed and almost impervious to water. To remediate sodic soils, gypsum or sulfuric acid is added and the soil leached.	

5.4 Area covered under the Project:-

Katihar District

Katihar, a part of Purnia division, has total area coverage of 3057 sq km. With a population of 2,389,533, the place is located at 25.53 degree north and 87.58 degree east. The district, with a population density of 782 persons per sq km, has a total literacy rate of 35.29% as per the 2001 census. An independent district since 1973, Katihar is primarily an agrarian region. Paddy is the chief commercial crop. However, the district also houses jute and paper mills.

While the total urban population of Katihar is 2, 18,246, total rural population is 2,171,287. Also for every 1000 males there are 919 females in the region. One of the interesting facts about Katihar is that it has only 23% of its population below poverty line.

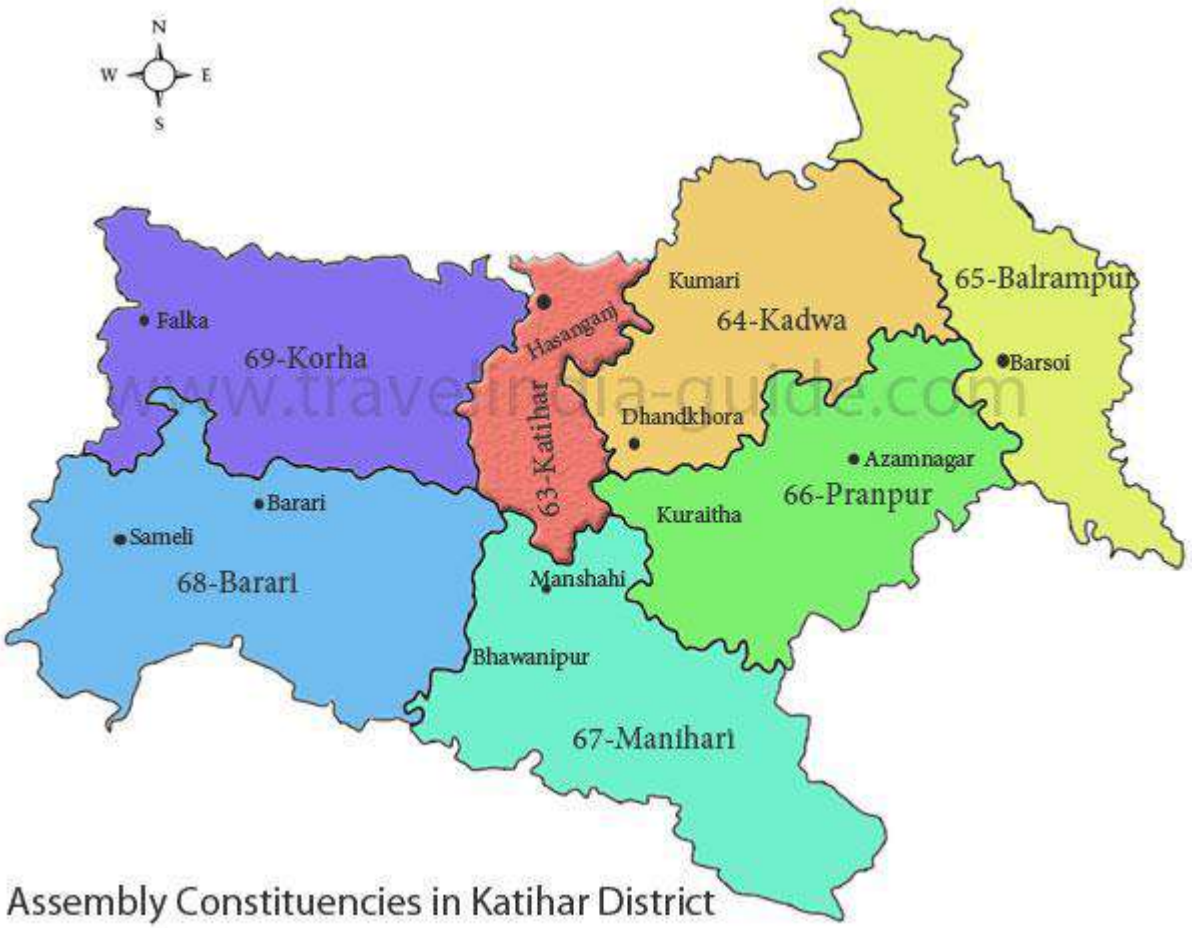
Named after a tiny village dighi-katihar situated at the northeast corner, the district has a rich heritage. Closely linked with Purnia by proper roads Katihar is well-known for the prominent northeast railway junction.

With a steadily increasing literacy rate and declining below poverty line mark, Katihar is surely making a mark of its own as one of the 37 districts of Bihar.

.	.	**Units**	.	.	**Units**
Headquarters:	**KATIHAR**	.	Total Area:	3057.0	sq. Kms.
Forest Area :	21.67	sq. Kms.	Net Sown Area:	1613.84	sq. Kms.
Occupied House:	313.86	'000	Net Irrigation Area :	613.89	sq. Kms.
Total Population	1825.38	'000	Total Literates	408.58	'000
Total Male	956.06	'000	Total Female	869.32	'000
Urban Population	171.62	'000	Rural Population	1653.76	'000
Rural Population - Male	862.96	'000	Rural Population - Female	790.8	'000
Urban Population - Male	93.09	'000	Urban Population - Female	78.53	'000
Total SC Population	160.05	'000	Total ST Population	101.79	'000
SC Population - Rural	142.19	'000	ST Population - Rural	99.72	'000
SC Population - Urban	17.86	'000	ST Population - Urban	2.08	'000
Total Male Literacy	295.31	'000	Total Female Literacy	113.27	'000
Rural Literates	314.73	'000	Urban Literates	93.85	'000
Rural Literates - Male	235.85	'000	Rural Literates - Female	78.88	'000
Urban Literates - Male	59.46	'000	Urban Literates - Female	34.38	'000
Rural Male Literacy %	34.95 %	.	Rural Female Literacy %	12.98 %	.
Urban Male Literacy %	76.59 %	.	Urban Female Literacy %	54.29 %	.
Total Workers ('000)	.	.	Male Workers ('000)	.	.

(A) **Project area** – Katihar,

Sr. No.	Distrcts	Block Name	No of village
1	Katihar	Korha	3
2		Falka	2
3		Kadwa	6
4		Barari	4

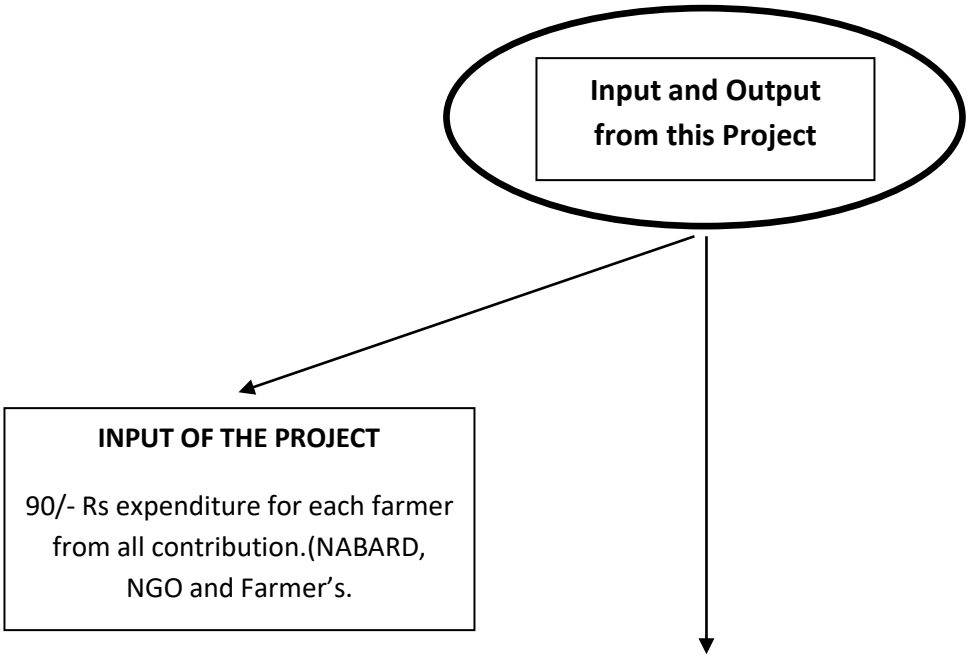


5.5 Number of beneficiaries targeted:-

(B) – Katihar,

Sr. No.	Distrcts	Block Name	No of village	No of small and marginal farmers/village	Total farmer's
1	Katihar	Korha	3	60	180
2		Falka	2	60	120
3		Kadwa	6	60	360
4		Barari	4	60	240
		Total Farmer's			900

Soil test on farmer's field:-



5.7 Expected outcome of the Project

Aim of the Project:-

1. **Soil test in front of farmer's it begins to build trust in their minds.**
2. **Through this activity, farmers get instant information about Acidic, Alkaline and Low organic carbon in soil.**
3. **The same kind of fertilizer was used by the farmers in the alkaline & Acidic soil , while the structure of the both soil are different, they got information from this programme.**
4. **Farmers got the opportunity of organic farming through this activity.**
5. **Market was available through this programme for organic manure made by farmers.**
6. **We can not apply organic farming 100% at one time but we have to start and these project's are beneficial . for promoting organic farming.**
7. **This project help the to know about organic % in soil and when the farmer aware for use organic manure than it help the nitrogen present in the atmosphere with organic fertilizer is readily available to the plants, insoluble nutrients in the soil are converted into a soluble state.**
8. **Due to the use of crops grown from chemical fertilizers, humans have to cope with many chronic diseases.**
9. **To examine the actual level of pH and organic carbon in soil before sowing crops**
10. **Farmer does not know about actual level of pH and they used unnecessary fertilizer dose, this project help to know about which fertilizer used for their land.**
11. **To guide the farmer for taking necessary steps to normalizing the pH and organic carbon level of soil ideal for farmer.**
12. **If the farmer removes the deficiency of organic manure through this project, then increase catalyses formation in plant tissue.**
13. **This project help to increase their yield in any crop.**
14. **This project helps them improve their health and well-being.**

This project is expected to deliver a number of development impacts:-

TDS & pH in water	pH & Organic carbon in soil
●To access safe drinking water to the all communities and Improved access to safe drinking water. ●Actual pH level in water and soil. ●To create and build socio- economic Awareness among the Rural community on water and Sanitation. ●To improve the health conditions and awareness and Access Health Education. ●Find out the real condition of water overall view. ●Find out where is the best place for drinking water and the exact depth tube well and TDS level in this village. ●Improve sanitation conditions. ●Strengthened ability of the community to manage and maintain its water supply systems and sanitation facilities. ●Primary school in rural areas physically improved and equipped. ●Students and teachers supported with school kits and training programs. ●Our organization aware to the farmer to know about the actual pH ●Level for different type of vegetable & crop.	●New sustainable supply chains providing low-cost soil testing facilities to small holder farmers. ●Increase awareness among farmer about the need for and benefits of soil test. ●20 to 30% reduction in fertilizer use per farmer for each growing season. ●To determine the levels of soil organic carbon and pH level in different soil types in Purnia. ●High quality and yield produce. ●To determine the effect of agricultural land management practices and environmental influences on both soil organic carbon. ●This project increase use of organic carbon. ●pH testing programme determination is an indispensable means for characterizing soil from the standard point of nutrient availability and physical condition, structure permeability, etc. ●pH level in soil provides information on the potency of toxic substance present in the soil. ●pH in soil indicative of the status of microbial communities and its net effect on the neutralization of organic residue and the immobilization of available nutrients. ●Ascertaining the soil pH provides the most rational basis for managing soil selected agricultural crops.

5.8 Duration of the Project. :-

Time schedule – Katihar,

Sr. No.	Distrcts	Block Name	No of Proramme in Block	Identify place and information about soil collection with the help of pump late. (No of day) (A)	No of programme and Day taken (B)	Min 60 sample in one programme +5	20 sample/day (C)	Add- A+B+C
1	Katihar	Korha	3	**3**	**3**	**180**	**9**	**15**
2		Falka	2	**2**	**2**	**120**	**6**	**10**
3		Kadwa	6	**6**	**6**	**360**	**18**	**30**
4		Barari	4	**4**	**4**	**240**	**12**	**20**
				+ - 5 to 10 days		**Total**		**75**

Total 4

S.no	Work	Total time duration
1	**Total 900 sample soil collection, estimating & conduct of Awareness programmes.**	4 Month
2	**Monitoring**	5 month
3	**Documentation and data collection form A 1 Month**	1 Month
	Total	**10 Month**

6.0 ESTIMATION FOR ONE YEAR:

Anx-1

Sl. No.	Description of item		Amount Indian Rs.
A	**Workshop Expenses**		
i)	Hall		1,000.00
ii)	Training material Pen/copy/file @60 X Rs 25/-		1,500.00
iii)	Pumplate 1000pc		500.00
iv)	Tea @100 X Rs.7/-		700.00
v)	Brochures @100 X Rs5/-		500.00
vi)	Trainer/ 2 Spoke person		2000.00
vii)	Fooding @60 x Rs 30/-		1800.00
viii)	Misclinous expenses		500.00
	Total		**8500.00**
B	**Target audience** **1. TDS & pH in water.** **2. Organic carbon & pH in soil**	@60Rs * 60 soil sample	3600.00
		Total A+B	12100.00
S.no	Block	No of village	Amount
1	Falka	2	Total 15 village
2	**Korha**	**3**	
3	Barari	4	
4	Kadwa	6	
	Total	**15*12100.00**	**1,81,500.00**

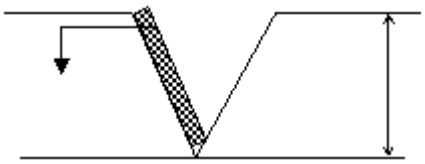
S.no	***Source of Fund***	***Particular***	***Amount***
6.1	**Contribution from NGO**	**(60 Farmer's @20Rs)* 15 village**	**18000.00**
6.2	**Contribution from Farmer's**	**(60 Farmer's @10Rs)* 15 village**	**9000.00**
6.3	**Contribution from other agencies**	**Nil**	
6.4	**Contribution from NABARD**	**Anx-1**	**181500.00**
	Total Amount :-		**2,08,500.00**

Points to be considered

1. Sampling at several locations in a *zig-zag* pattern ensures homogeneity.
2. Fields, which are similar in appearance, production and past-management practices, can be grouped into a single sampling unit.
3. Collect separate samples from fields that differ in colour, slope, drainage, past management practices like liming, gypsum application, fertilization, cropping system *etc*.
4. For shallow rooted crops, collect samples up to 15 cm depth. For deep rooted crops, collect samples up to 30 cm depth. For tree crops, collect profile samples.

Procedure

1. Divide the field into different homogenous units based on the visual observation and farmer's experience.
2. Remove the surface litter at the sampling spot.
3. Drive the auger to a plough depth of 15 cm and draw the soil sample.
4. Collect at least 10 to 15 samples from each sampling unit and place in a bucket or tray.
5. Remove thick slices of soil from top to bottom of exposed face of the 'V' shaped cut and place in a clean container.



1 inch / 2.5 cm 6 inches (15 cm)

1. Mix the samples thoroughly and remove foreign materials like roots, stones, pebbles and gravels.
2. Quartering is done by dividing the thoroughly mixed sample into four equal parts. The two opposite quarters are discarded and the remaining two quarters are remixed and the process repeated until the desired sample size is obtained.
3. Collect the sample in a clean cloth or polythene bag.
4. Label the bag with information like name of the farmer, location of the farm, survey number, previous crop grown, present crop, crop to be grown in the next season, date of collection, name of the sampler *etc*.

Estimation of soil pH .

1. The pH meter was calibrated using pH 7 buffer solution.
1. Then the meter was adjusted with known pH of buffer solutions 4.0 and 9.2.
2. 20 g of soil was weighed and transferred into 100 mL beaker.
3. 40 mL distilled water was added and stirred well with a glass rod.
4. This was allowed to stand for half an hour with intermittent stirring.
5. To the soil water suspension in the beaker, the electrode was immersed and pH value was determined from the automatic display of the pH meter.

Estimation of soil organic carbon (%).

1. Estimation of organic carbon in soil by walkley and black method or soil testing kit.

Estimation of Total dissolved solids (TDS) in water

TDS meter use for TDS measured on a quantity scale, either in mg/L or, more commonly, in parts per million (ppm). Simply put, if the TDS level is 335 ppm, this means that out of one-million parts of H2O, 335 of those parts are something else.

Estimation of Total pH in water.

Water pH checked by pH meter.

Organizing awareness program on soil and water purification

Exhibits, conferences, Workshops, and presentations.

Displays , Brochures, Posters, Target Audience, Pitching success story .

Monitoring and follow up.

After Plantation the crop monitored will be done at intervals of 30, 60, 90 days
by the members of the Ayushman Foundation and collected all information given by farmer's.

7.0 Market linkages

Not Applicable for this Project.

10.1 Monitoring Indicators

MARPHOLIGICAL DATA ON FIELD (after physiological meturity of crops.

1. **1000-grain weight**
   The dry weight of a sub sample of filled grains is divided by its grain number and multiplied by 1000 to obtain the 1000-grain weight. The average of three sub samples from each plot will be taken to compute the final 1000-grains weight.

2. **Grain yield (t ha^{-1})**
   Grain yield is determined on the same area marked for determining plant survival after submergence. Grains are harvested, dried and weighed, and grain weight is adjusted to a moisture content of 0.14 g H_2O g^{-1} fresh weight.

3. **Harvest Index**
   Harvest index (HI) is calculated using the formula of Beedle (1982).

   $$HI = \frac{\text{Economic yield}}{\text{Biological yield}} \text{ or } \frac{\text{(Filled grain weight in g } m^{-2})}{\text{Shoot dry wt. in g } m^{-2} + \text{Total grain wt. in g } m^{-2}}$$

4. **Grain yield (kg/ha)**

5. **Straw yield** =((Bulk weight – grain weight) x 10000)/Plot size

6. **Harvest Index** = Grain yield /ha x 100 / biological yield

7. **Biological yield** = Straw yield + grain yield .

Note :- This observation help to read for yield purposes.

11. Sustainability of the project:-

This programme is beneficial for farmer's and also we try to develop new ideas for farmer's and decrease the cost of farming and increase crop yield .During soil testing, if a pH and organic carbon % less than average% or more than average% in a soil, then it is again checked by foundation, We are try to watch from the soil collection from field to the test.To start working on time means that soil testing should be done before planting and informing the result is the greatest achievement of this program. To make this program sustainable, the organization which promoted it also depends on it to start this work on time. ***The main reason for the success of any work is to have money according to need***, ***and there are trained people associated with this program, farmers benefit from this program, and be a aware farmer who wants to make his soil healthy***. The institution is capable of all the above activities and involvement of NABARD will be more potency in this work.

By which process we monitor soil testing and collecting data from time to time makes soil investigation better in the process. This programme helped farmer's to select better fertilizer from market. The way that we are running this program, this program has sustainability of project. Earlier we mention that 92% of the farmers have benefited and our way of working improves the project. We have many techniques which can monitoring the activity of the plant even after planting and know about the good bad results during the time, and can make changes in time and that's the beauty of our work.

Causes of Acidic and Alkaline Soil :-

1. Acidic Soil	2. Alkaline Soil
●Soil acidity can be caused by a number of factors: ●Soil in areas with large amount of rainfall tend to be acidic because the water leaches basic cations calcium, magnesium, sodium, and potassium out of the soil profile, and these cations are then replaced by acidic (hydrogen and aluminum).	●Soil may be alkaline due to over liming acidic soils. Also alkaline irrigation waters may cause soil alkalinity.
●Acidic soil tends to be high in iron and aluminum oxides, as they are the slowest minerals to weather in soil. Aluminum in these increasingly acidic soils is solublized and will combine with water to release additional hydrogen ions acidity).	●Soil alkalinity can be affected temporarily by soil amendments with acid- forming ingredients or permanently by the basic characteristics of the soil and underlying rock types.
●Nitrification of ammonium fertilizer yields hydrogen ions.	●Alkaline plant materials increase soil pH over time. Large deposits of naturally occurring lime act as a buffer to keep soil pH in alkaline range. Arid or desert conditions, in which water evaporates quickly, increase the salt content of soil, leaving it more alkaline over time.
●Acid rain contains nitric and sulfuric acid.	
●Added elemental sulfur oxidizes to form sulfuric acid.	
●Plant roots excrete (mRlftZrdjuk) hydrogen ion in exchange for nutrients in the soil.	