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Soil Resource Mapping and Soil Site Suitability of Major Crops in Irrigated Ecosystem of New Alluvium Plain: A Case Study from Howrah Krishi Vigyan Kendra, ICAR

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Abstract:
The brunt of soil resource depletion due to chemicalised agricultural practices as well as abrupt climate change has been primarily borne by the farmers who are facing economic insecurity year by year. An initiative was taken up towards resource mapping by Howrah KrishiVigyan Kendra in collaboration with Inhana Organic Research Foundation (IORF, Kolkata); with an objective to bring forth visual interpretation of soil character for specific management and better resource utilization. Along with this objective, soil- site suitability was also evaluated which was directed towards assessment of present crop potentials under existing soil character and climatic variations and suggesting the alternate options that could ensure both crop and economic security. The study was done at KrishiVigyan Kendra located in Jagatballavpur village under Jagatballavpur Block of Howrah Sadar Sub-division and falls under the New Alluvial and Old Alluvial Agro-climatic zone of West Bengal, India.
The results from soil analysis were expressed in the form of different thematic maps based on different aspects viz soil texture, pH, organic carbon, available NPKS, soil microbial biomass carbon, fluoresce in diacetate hydrolysis (FDAH), microbial quotient (qMBC), microbial metabolic quotient (qCO_2), qFDA, microbial respiration quotient(Q_R) and Soil Quality Index (SQI).
Soil- site suitability evaluation of some crops viz. paddy, wheat, maize, groundnut, sesame and mustard were taken up. The initiative was directed towards helping out the farming community who perhaps need to shift from their local soil knowledge and thereby crop suitability for their land in order to sustainably increase productivity or at least become aware of alternate crops that can possibly ensure economic security even under unpredictable climate.

Key words: *soil thematic map, soil quality index, soil site suitability*

1. Introduction
Crop output which is already suffering due to severe depletion of resources; especially that of soil and pest mutagenicity, now suffers from the threat of getting completely derailed under the present climate change impact. Hence, it is necessary to maintain soil quality as it is an integral part of sustainable agriculture (Miller and Wali, 1995). In this respect, soil evaluation especially in terms of the microfloral activity and soil quality; followed by resource mapping can enable the maintenance of soil resource base while tapping the potential areas simultaneously with the target of better farm productivity. However, it is necessary to select the judicious crops for cultivation according to the soil suitability, so that maximum profit may be achieved while maintaining the ecological sustainability (Khan and Khan, 2014). Soil- site suitability studies provide information on the choice of crops to be grown on best suited soil units with the aim of maximum crop production per unit of land, labour and inputs. For planning of effective utilization of soil resources, information related to the soil -site characteristics is necessary (Naidu, 2006). In order to follow the principles of sustainable

agriculture one has to grow crop where they adapt the best and for that, the first and foremost requirement is to carry out land suitability analysis (Ahamed*et al*., 2000).
The joint initiative in Howrah KrishiVigyan Kendra was taken up as because a systematic approach from the basic level was felt to be necessary in order to reach out to the farmers. Soil Resource mapping followed by soil site suitability will help to develop a guideline with alternate crop options for higher productivity and better livelihood support.

2. Materials and Method

2.1. Study Area
The study was done collaboratively by Inhana Organic Research Foundation (IORF) and Howrah KVK (ICAR) at Howrah KrishiVigyan Kendra (KVK) which is situated in Jagatballavpur village under Jagatballavpur Block within Howrah Sadar Sub-division of West Bengal, India. It is situated in the hot moist sub-humid agro-ecological situation having annual rainfall between 1100 to 1500 mm of which 75-80 % is received during June to September. The mean annual maximum and minimum temperature fluctuates from 40.2° to 10.8° C and relative humidity ranges between 66 to 85 %.

Figure 1: Landscape View of Howrah KrishiVigyn Kendra (ICAR), Jagatballavpur, Howrah

2.2. Soil Quality Analysis
The soil samples were air dried ground with wooden pestle in a mortar and passed through 2 mm sieve. The sieved soil samples were stored separately in clean plastic containers and their physicochemical and fertility parameters were analyzed later as per the standard procedure suggested by Jackson (1973) and Black (1965) while the microbial study was done as per the methodology of Weaver*et al*. (1998).

2.3. Soil Site Suitability
The soil-site suitability criteria for different crops were assessed as per the guidelines of Sys *et al.* (1991) and NBSS & LUP (1994). The physical and chemical properties of the land as well as the climatic factors are the major determinants for crop suitability of a given area (Khan and Khan, 2014). So, the physical land properties of the study area were evaluated, including the soil texture, drainage, and soil depth. The slope of the land was also considered. Climate (Temperature and Rainfall) of the study area was also taken into account for crop suitability analysis. The chemical properties of soil like pH (negative log of hydrogen ion concentration), CEC (cation exchange capacity), EC (electrical conductivity) and ESP (exchangeable sodium percentage) were as well as considered for soil site suitability analysis. Suitability classes were determined with regards to the number and intensity of limitations. The soils were evaluated in different suitability classes (Sys *et al*., 1991) as given below:

S1 – Highly suitable: Optimum condition for plant growth (S1-2) have slight limitation, no more than one correctable moderate limitation.
S2 – Moderate suitable: Land units, having moderate limitations that affect productivity by 20 to 40%.
S3 – Marginally suitable: Land units, representing strong conditions; affect productivity significantly but still marginally economical, have more than 3 moderate limitations and no more than one severe limitation (correctable) that, however, do not exclude the use of land.
Order N – not suitable: Land which has qualities that appears to preclude its sustained use.
N1 – Currently not suitable (Actually unsuitable but potentially suitable): Land unit(s),having limitations, which may be surmountable with time; have a severe limitation that excludes the use of the landor more than one severe limitation that cannot be corrected.

N2 – Permanently not suitable (Actually andpotentially unsuitable): Land unit(s),having limitations, which appear, so severe as to preclude any possibilities of successful sustained use of land in a given manner.

This method also identifies the dominant limitations that restrict the crop growth with the sub-class symbol such as climatic (c), topographic (t), wetness (w), physical soil characteristics (s), soil fertility (f) and soil salinity/alkalinity (n). The suitability classes and sub-classes were decided by the most limiting soil characteristics (SelvarajandNaidu, 2012).

2.3. Soil Resource Mapping:

Soil resource mapping in terms of different soil quality mapping as well as soil site suitability of different cereals and oilseeds majorly grown in the area viz. Paddy (*Oryza sativa*), Wheat (*Triticumaestivum*), Maize (*Zea mays*), Groundnut (*Arachishypogaea*), Sesame (*Sesamumindicum*) and Mustard (*Brassica juncea*) were mapped using GIS Software (Map Info 8.5).

3. Results and Discussion

Soil thematic maps representing different soil quality components were developed for Howrah KVK in order to better understand the soil resource of the agricultural farm. Different soil thematic maps *viz.* soil texture, soil pH, ECe, organic carbon, available NPKS, soil microbial biomass carbon, soil fluoresce in diacetate hydrolysis (FDA), soil microbial quotient (qMBC), soil microbial metabolic quotient (qCO_2), qFDA, soil microbial respiration quotient(Q_R),) and Soil Quality Index (SQI) were prepared using GIS software.

Figure 2:Analysis of soil fertility parametersat Howrah KVK Laboratory

Figure 3: Analysis of soil biological properties at the laboratory of IORF, Kolkata

Soil Resource Mapping of Agricultural farm under Howrah KVK (ICAR) / 1

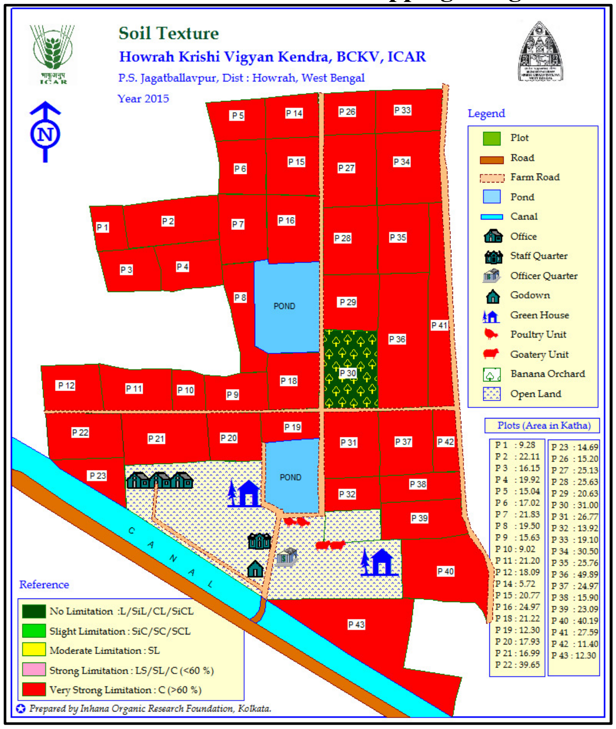

Figure 4: Thematic mapping of soil texture

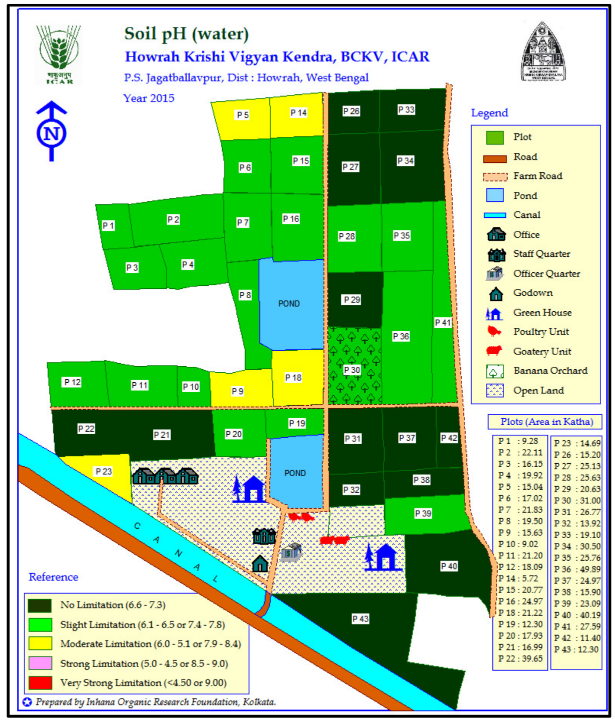

Figure 5: Thematic mapping of soil pH

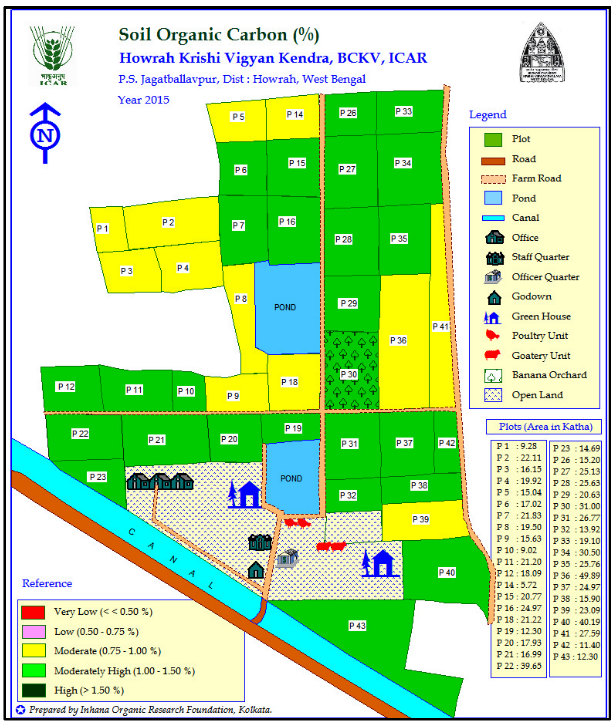

Figure 6: Thematic mapping of soil organic carbon

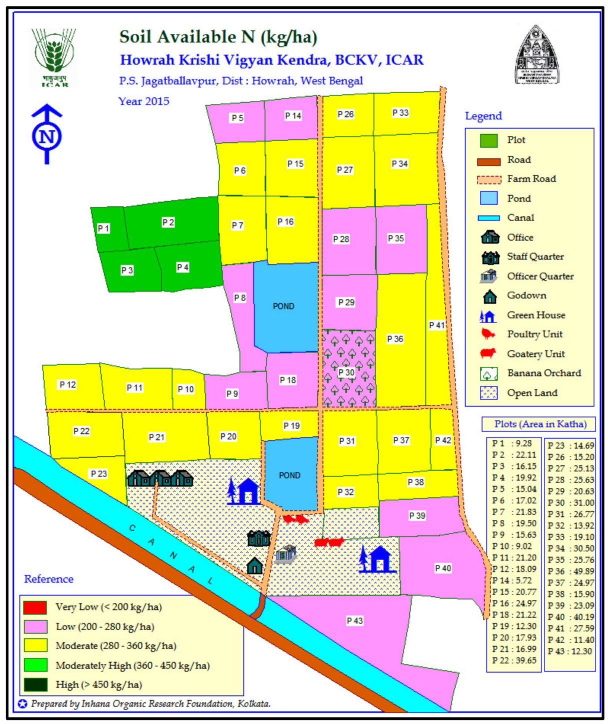

Figure 7: Thematic mapping of soil available Nitrogen

Sl No	Class	Range Value	Area	% TCA
Soil PH (water)				
1	No limitation	6.5 - 7.5	312.65	38.22
2	Slightly limitation	5.5 - 6.5 or 7.5 - 8.0	433.05	52.94
3	Moderate limitation	5.0 - 5.5 or 8.0 - 8.5	72.30	8.84
4	Strong Limitation	4.5 - 5.0 or 8.5 - 9.0	0.00	0.00
5	V. Strong Limitation	< 4.5 or > 9.0	0.00	0.00
Soil organic carbon (%)				
1	Very Low	< 0.50	0.00	0.00
2	Low	0.50 - 0.75	0.00	0.00
3	Moderate	0.75 - 1.00	242.68	29.67
4	Moderately High	1.00 - 1.50	575.32	70.33
5	High	>1.50	0.00	0.00
Available Nitrogen (kg/ha)				
1	Very Low	< 200	0.00	0.00
2	Low	200 - 280	255.71	31.26
3	Moderate	280 - 360	494.83	60.49
4	Moderately High	360 - 450	67.46	8.25
5	High	> 450	0.00	0.00
Soil available phosphate (kg/ha)				
1	Very Low	< 22.50	0.00	0.00
2	Low	22.5 - 45.0	105.25	12.87
3	Moderate	45.0 - 70.0	499.72	61.09
4	Moderately High	90.0 - 110.0	126.80	15.50
5	High	> 110.0	86.23	10.54
Soil available potash (kg/ha)				
1	Very Low	< 150	0.00	0.00
2	Low	150 - 250	31.00	3.79
3	Moderate	250 - 340	271.42	33.18
4	Moderately High	340 - 450	422.62	51.67
5	High	> 450	92.96	11.36
Soil available sulphate (kg/ha)				
1	Very Low	< 20	31.00	3.79
2	Low	20 - 60	115.63	14.14
3	Moderate	60 - 100	525.86	64.29
4	Moderately High	100 - 140	124.75	15.25
5	High	>140	20.76	2.54
Soil Fertility Index				
1	Very Low	< 15	0.00	0.00
2	Low	15 - 20.00	0.00	0.00
3	Moderate	20.01 - 25.0	486.10	59.43
4	Moderately High	25.01 - 30.0	300.90	36.78
5	High	> 30.00	0.00	0.00

Table 1: Spatial Distribution of Physicochemical Properties

3.1. Soil Texture

Texture is a unique property of soil that will have a profound effect on soil behavior, such as water holding capacity, nutrient retention/ supply, drainage and nutrient leaching (CTAHR, 2015). Analysis of particle size distribution in soil indicated more than 60% clay content, which rendered very strong textural limitation in the whole farm except in Plot No. 30 where soil is of silty clay loam texture (Figure 4).

Soil Resource Mapping of Agricultural farm under Howrah KVK (ICAR) / 2

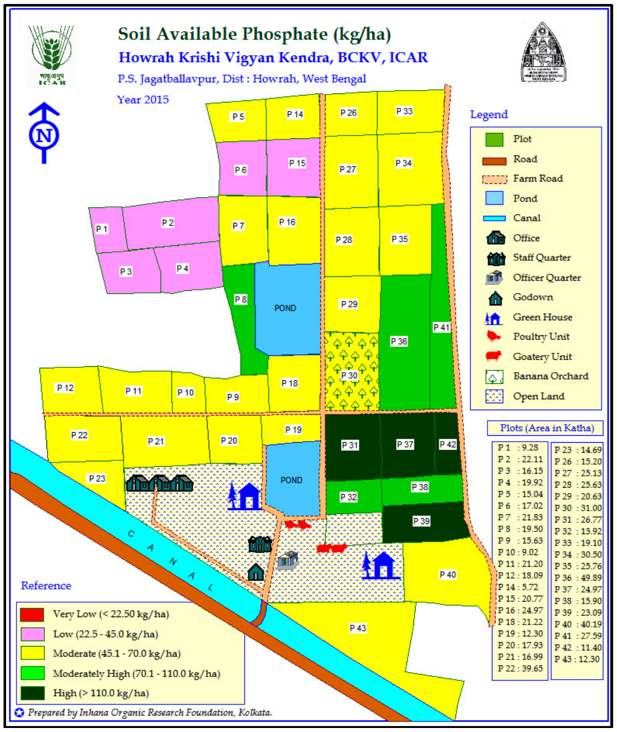

Figure 8: Thematic mapping of soil available Phosphate

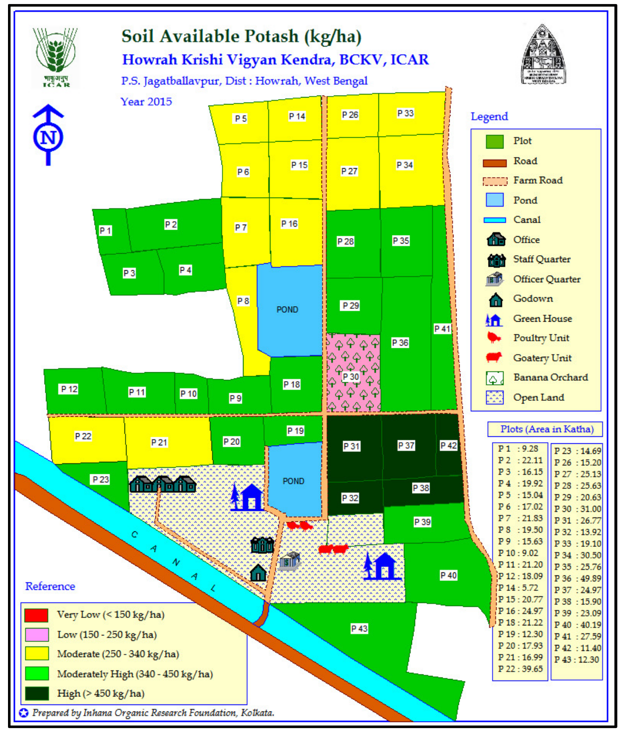

Figure 9: Thematic mapping of soil available Potash

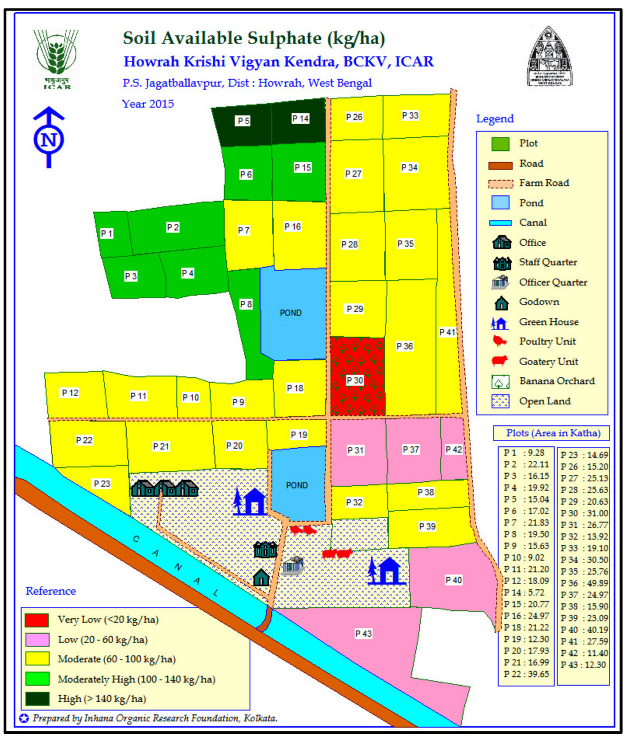

Figure 10: Thematic mapping of soil available sulphate

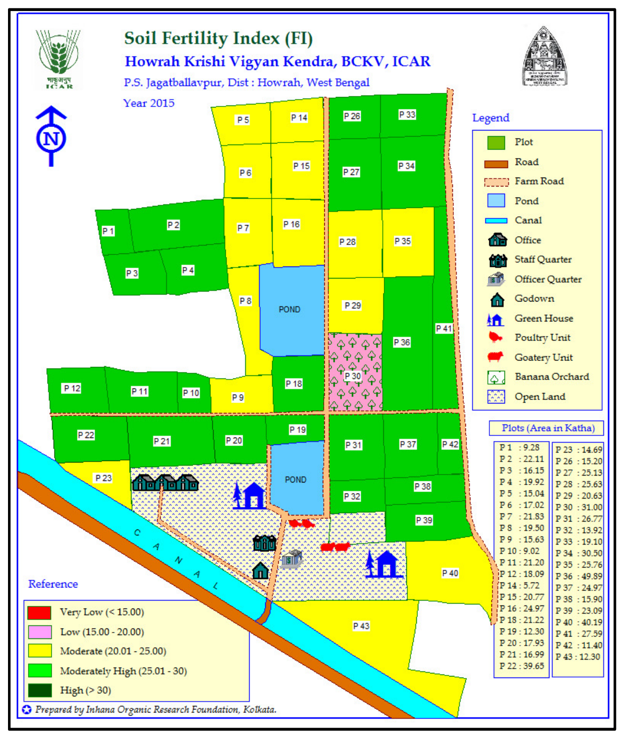

Figure 11: Thematic mapping of soil fertility index

3.2. Soil pH

The relevance of soil pH in crop production is well understood because it influences microbial activity which produces improved soil tilth, aeration and drainage (Fierer and Jackson, 2006). This in turn allows for better use of nutrients, increased root development, and drought tolerance of plants. pH level that will foster good growth and yield, varies crop- wise and shift from the desired pH can adversely affect the crop life cycle. Table 1 reveals 38.2% of the total area showed no limitation while 52.9% area suffered from slight limitation of pH which again thematically represented in Figure 5.

3.3. Soil Organic Carbon

Soil organic carbon is the basis of soil fertility. It releases nutrients for plant growth, promotes structure, biological and physical health of soil, and is a buffer against harmful substances (Patil and Handore, 2014). 'Soil organic carbon' (SOC) – the amount of carbon stored in the soil is a component of soil organic matter – plant and animal materials in the soil that are in various stages of decay. Moderately high status (1.0- 1.5%) was recorded in major portion (70.3% area) of the farm while moderate (0.75- 1.0%) content was documented in 29.7% area (Table 1 and Figure 6).

3.4. Soil Available Macro Nutrients

Soil fertility is dependent upon the continuous replenishment of nutrients and organic matter that is depleted each cropping season. Understanding NPK (Nitrogen, Phosphorus, and Potash) ratings on soil and plant fertilizers is an important part of deciding whether or not fertilizers are appropriate or even necessary for field. Nitrogen is a major constituent of several of the most important plant substances. For example, nitrogen compounds comprise 40% to 50% of the dry matter of protoplasm, and it is a constituent of amino acids, the building blocks of proteins (Swan , 1971). But then again, though the most abundant element in the atmosphere, itis usually the most limiting crop nutrient as because some processes (mostly microbial transformations) are necessary to convert N into forms which plants can use. Evaluation revealed moderate status (280 to 360 kg/ha) of available-N in more than 60% of the farm area while 31.3% area represented low status (Figure 7). Moderate status of available- P_2O_5 (45 – 70 kg/ ha) was documented in more than 60% area following a trend similar to available- N. 15.5% area exhibited moderately high (90 – 110 kg/ ha) status while low (22.5 to 45 kg/ ha) content (Figure 8) was recorded in 12.9% area. Potassium is an essential plant nutrient and is required in large amounts for proper growth and reproduction (Prajapati and Modi, 2012). Evaluation revealed high status (>450 kg/ha) of available-K_2O in 11.4% area, moderately high status (340 to 450 kg/ha) in more than 50% of area, while 33.2% area had moderate (250 to 340 kg/ ha) status (Figure 9).

Sulphur is one of the prime elements in plant nutrition (Coleman, 1966). Sulfur is taken up by plants as sulfate, an anion that is mobile in the soil and subject to loss through leaching or volatilization, much like nitrate. Moderate status of available- SO_4 (60– 100 kg/ ha) was documented in more than 60% area following a trend similar as available- N and P_2O_5, 15.3% area represented moderately high (100– 140 kg/ ha) status while low (20.0- 60.0 kg/ ha) content was recorded in 14.1% area (Figure 10).

3.5. Soil Fertility Index

Fertile soil holds plants in place while supplying them with life-supporting essential plant nutrients that they need to survive (Madeley, 2002). The relevance of macro nutrients i.e., N, P, K and S towards plant growth is well established. However, to understand their availability in relation to plant nutritional requirement, Fertility Index (FI) was used. FI indicates the overall availability status of available N, P, K and Son a continuous relative scale. Fertility index was found to be moderately high (100- 140 kg/ ha) in about 60% area while the rest 40% area had moderate (60- 100 kg/ ha) status (Figure 11).

3.6. Soil Biological Properties

The important role that soil microorganisms play in the nutrient and energy-flow relationships of natural as well as man- manipulated environments has given rise to the need for easily measured biological indicators of ecosystem development and disturbance (Yan *et al*., 2003). The outcomes of biological properties analysis are tabulated in table 2. Microbial biomass is a useful indicator of soil quality and changes rapidly in response to changes in soil properties (Smith and Paul, 1990). Their high status indicates beneficial biological functions in soil and scope for future increase in organic carbon, while decline in value is considered to have a negative effect on soil quality. Low (150- 300) microbial biomass was found in 51.6% farm area, moderately low (300- 450) status in 38.8% area while moderate (450- 600) status was recorded in 9.5% area (Figure 12). Fluorescein di-acetate (FDA) can serve as a viability probe that measures both microbial enzymatic activity (Adam and Duncan, 2001) and cell-membrane integrity.

Soil Resource Mapping of Agricultural farm under Howrah KVK (ICAR) / 3

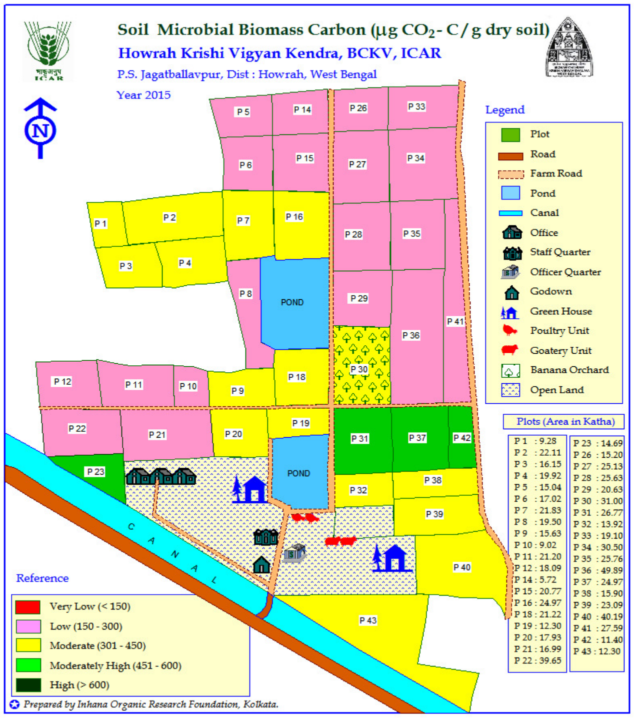

Figure 12: Thematic mapping of soil microbial biomass carbon

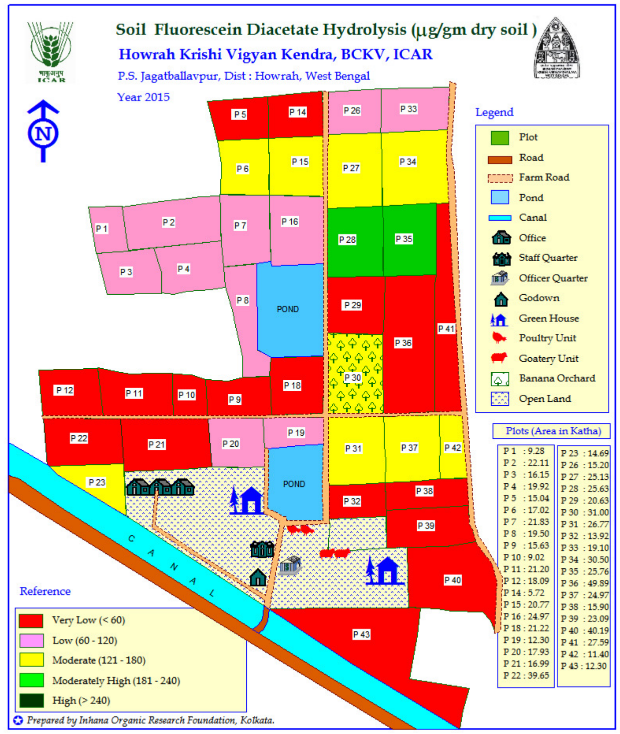

Figure 13: Thematic mapping of soil fluorescein diacetate hydrolysis activity

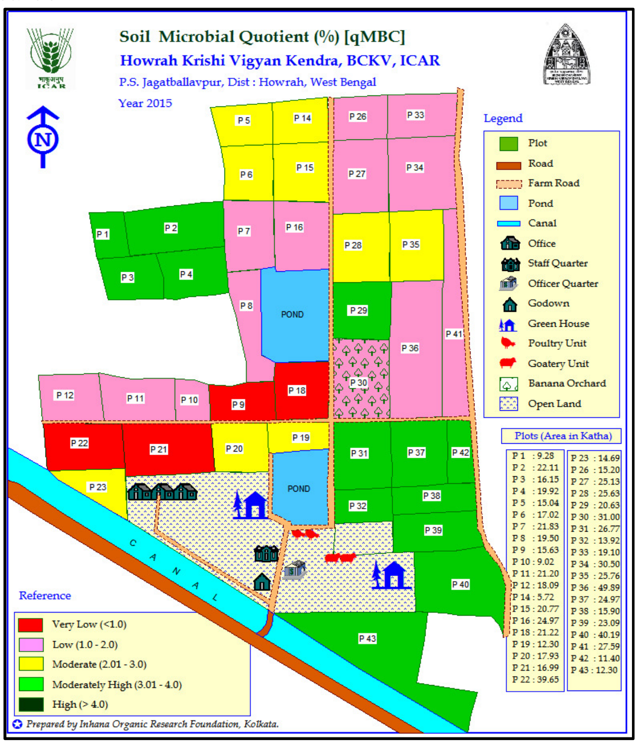

Figure 14: Thematic mapping of soil microbial quotient

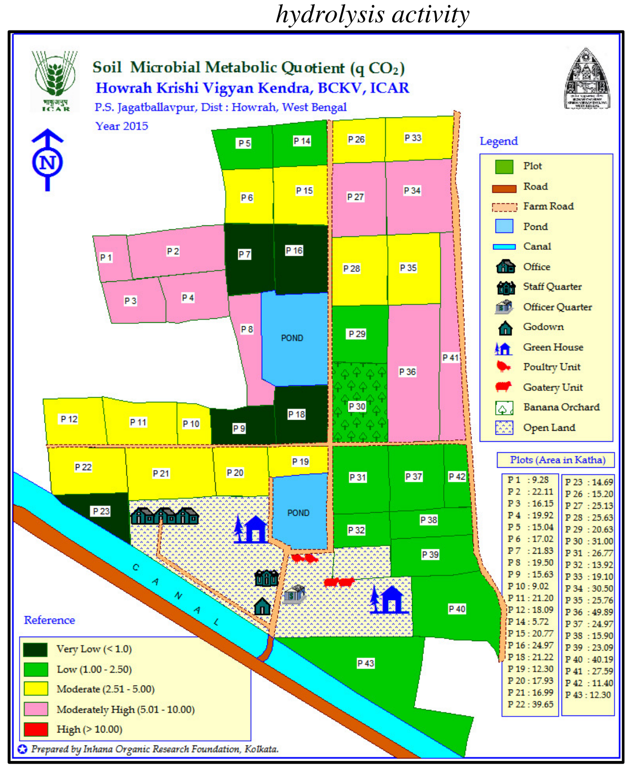

Figure 15: Thematic mapping of soil microbial metabolic quotient

Sl No	Class	Range Value	Area	% TCA
Soil Microbial Biomass Carbon (µ CO_2- C/ g dry soil)				
1	Very Low	< 150	0.00	0.00
2	Low	150 - 300	422.43	51.64
3	Moderate	300 - 450	317.74	38.84
4	Moderately High	450 - 600	77.83	9.51
5	High	> 600	0.00	0.00
Soil Fluorescein Di-acetate Hydrolysis (FDA) (µg/g dry soil)				
1	Very Low	< 60	366.07	44.75
2	Low	60 - 120	198.29	24.24
3	Moderate	120 - 180	202.25	24.72
4	Moderately High	180 - 240	51.39	6.28
5	High	> 240	0.00	0.00
Soil qMBC (Microbial Quotient) %				
1	Very Low	< 1.0	0.00	0.00
2	Low	1.0 - 2.0	238.06	29.10
3	Moderate	2.01 - 3.0	174.47	21.33
4	Moderately High	3.01 - 4.0	353.93	43.27
5	High	> 4.0	51.54	6.30
Soil qCO_2 (Microbial Metabolic Quotient)				
1	Very Low	< 1.0	98.34	12.02
2	Low	1 - 2.50	240.93	29.45
3	Moderate	2.50 - 5.00	258.66	31.62
4	Moderately High	5.00 - 10.0	220.07	26.90
5	High	> 10.00	0.00	0.00
Soil Microbial Respiration Quotient (Q_R)				
1	Stress condition	0.80- 1.00	0.00	0.00
2	Extremely low	<0.10	318.64	38.95
3	Low	0.10- 0.30	499.36	61.05
4	Moderate	0.30- 0.50	0.00	0.00
5	High	0.50- 0.80	0.00	0.00
Soil Quality Index				
1	Very poor	<0.30	0.00	0.00
2	Poor	0.30- 0.50	657.78	80.41
3	Moderate	0.51- 0.75	160.22	19.59
4	Good	0.76- 1.00	0.00	0.00
5	Very good	> 1.00	0.00	0.00

Table 2: Spatial Distribution of soil biological properties

Figure. 13 presented that 44.8% farm soil indicated very low fluorescence (< 60), about 24% area showed low (60- 120) to moderate (120- 180) activity while moderately high activity was recorded in only 6.3% area.

Soil microbial quotient i.e. qMBC, is a ratio of soil microbial biomass C/ organic C that can provide an effective early warning regarding deterioration of soil quality (Wardle, 1992). Moderately high (3.01- 4.0), low (1.0- 2.0), moderate (2.01- 3.0) and high (>4.0) status was recorded in 43.3%, 29.1%, 21.3% and 6.3% area respectively (Figure 14). Microbial metabolic quotient (qCO_2) calculated as the amount of CO_2 -C produced per unit microbial biomass C, is being used by scientist worldwide to understand environmental conditions adversity or stress (Killham, 1985). Low to moderate metabolic activity of the microbes is noted (Figure 15) in 51.6% and 38.8% farm area respectively while only 9.5% area represented moderately high ratio.

The soil microbial respiration quotient (QR)is the ratio of basal soil respiration to substrate induced respiration (Goswami*et al.*, 2013) and indicates the physiological state of soil microorganisms. Extremely low to low status was recorded in 39% and 61 % area respectively, indicating that the microbes will divert energy from growth into maintenance in this condition (Figure 16).

Soil Resource Mapping of Agricultural farm under Howrah KVK (ICAR) / 4

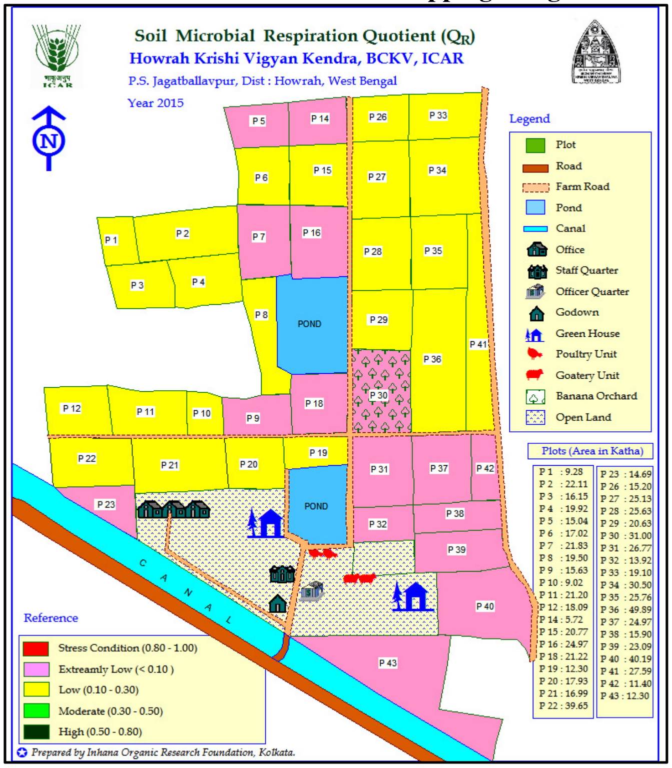

Figure 16: Thematic mapping of soil microbial respiration quotient.

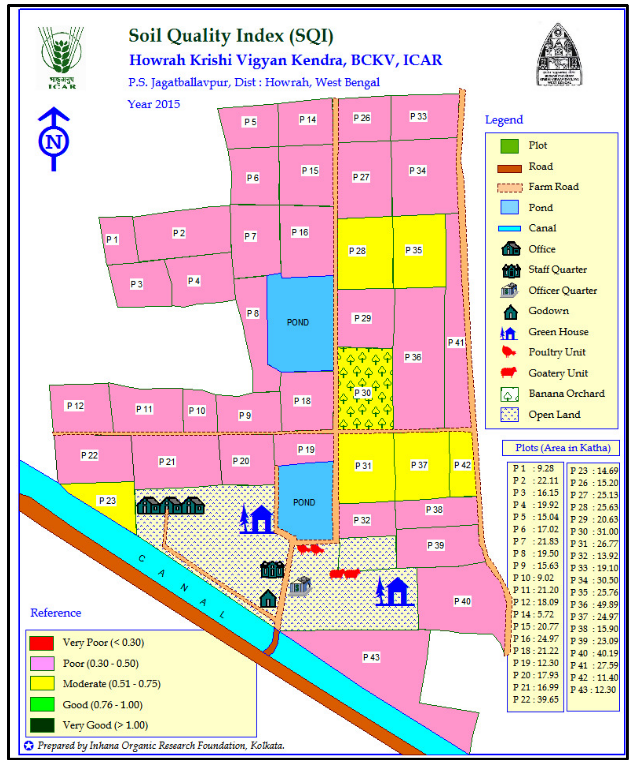

Figure 17: Thematic mapping of soil quality index

3.7. Soil Quality Index

Soil Quality Index is a tool towards understanding the true nature of soil productivity as well as measuring the change in soil quality in an accountable manner relating to the undertaken management practices (Karlen and Scott, 1994). Major farm area was recorded to be of poor (0.3- 0.5) soil quality with moderate (0.51- 0.75) status in only 19.6% area (Figure 17).

3.8. Soil Site Suitability

Soil - site suitability evaluation is the pre-requisite for land use planning (Sys *et al.*, 1993). Besides this, the potential of soils for alternative uses are also determined. As soil- site suitability evaluation clearly indicates the nature of constraints that hamper optimal production, scope for proper reclamation and management of natural resources within the selected land use framework also remains (Varheye, 1993). The detailed soil site suitability of different crops in Howrah KVK is given in table 3.

<u>3.8.1. Soil Site Suitability of Paddy (Oryza sativa)</u>

In West Bengal agrarian scenario, cropping pattern is dominated by paddy (Rahim *et al.*, 2011). The state is the largest producer of this crop in the country; it being the staple food of this region. The district of Howrah is no exception to thisand hence, paddy became a primary growing crop in Howrah KVK as well. Accordingly, the crop was also found to be highly suitable (S1) in these soils.

<u>3.8.2. Soil Site Suitability of Wheat (*Triticumaestivum*)</u>

Next to paddy, wheat is an important crop of this region as well augmenting cereal food production in a food deficit state like West Bengal. In this respect, identification of the constraints which influence yield of wheat becomes pertinent. Conditions of growth for wheat are more flexible than those of rice and can be grown in variety of soils (Krishi Bazar, 2016). West Bengal has made significant progress both in area and production of wheat with the introduction of new technology. Almost entire cultivated area of the farm was found to be moderately suitable (S2) for wheat cultivation (Figure 20).

<u>3.8.3. Soil Site Suitability of Maize (Zea mays)</u>

Maize is not only an important food crop, but also a basic element of animal feed. It is the raw material for manufacture of many industrial products also. It is a versatile crop grown over a range of agro climatic zones with suitability to diverse environment unmatched by any other crop (NPCS Team, 2014). Soil-site suitability evaluation indicated moderate suitability (S2) of this crop in almost all the farm soils and highly suitable (S1) in a small area representing plot no. 30 (Figure 21).

3.8.4. Soil Site Suitability of Groundnut (Arachishypogaea)

Groundnut is a crop which is convenient to both smallholders and large commercial producers. It is classified as both a grain legume (Hymowitz, 1990) and an oil crop (Eshun*et al*., 2013), because of its high oil content. Being a legume, the crop harbourssymbioticnitrogen-fixing bacteria in its root nodules thereby requiring less nitrogenous fertilizers and improve soil fertility, making them invaluable in crop rotations. Figure 22 illustrates groundnut to be marginally suitable (S3) in the farm due to major limitations of texture and organic carbon.

3.8.5. Soil Site Suitability of Sesame (Sesamumindicum)

Sesame seed is one of the oldest oilseed crops known which is highly tolerant to drought-like conditions and grows where other crops may fail. Sesame seedyields approximately 50% oil content (Hwang, 2005). West Bengal is one of the major producers of sesame primarily as a kharif crop with some areas being cultivated as rabi crop. Sesame was found to be marginally suitable (S3) for the soil of KVK (Figure 23) due to limitations of texture and organic carbon.

3.8.6. Soil Site Suitability of Mustard (Brassica juncea)

Mustard is a major oil seed crop grown in the country and provides the major source of income especially for the marginal and small farmers (Kumar *et al*., 2009) since it can be grown in the rain-fed and resource scarce areas. In West Bengal the yellow variety is grown in wide areas as a short duration rabi crop. Mustard was found to be marginally suitable (S3) in almost entire cultivated area of the farm due to major limitation of drainage followed by soil texture and pH (Figure 24).

Figurer 18: Organic Paddy cultivation using Inhana Rational Farming Technology at Howrah KVK (ICAR)

Soil Site Suitability of different crops at Agricultural farm under Howrah KVK (ICAR) / 1

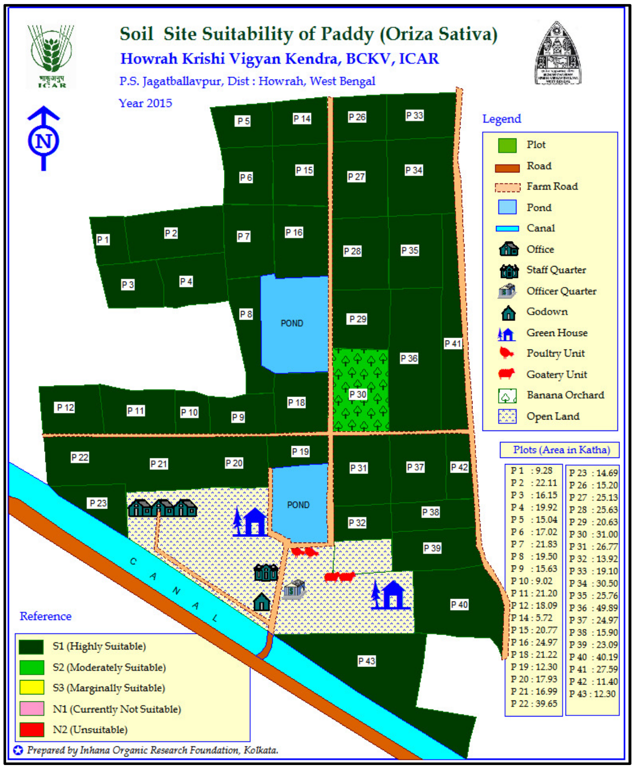

Figure 19: Soil Site Suitability of Paddy

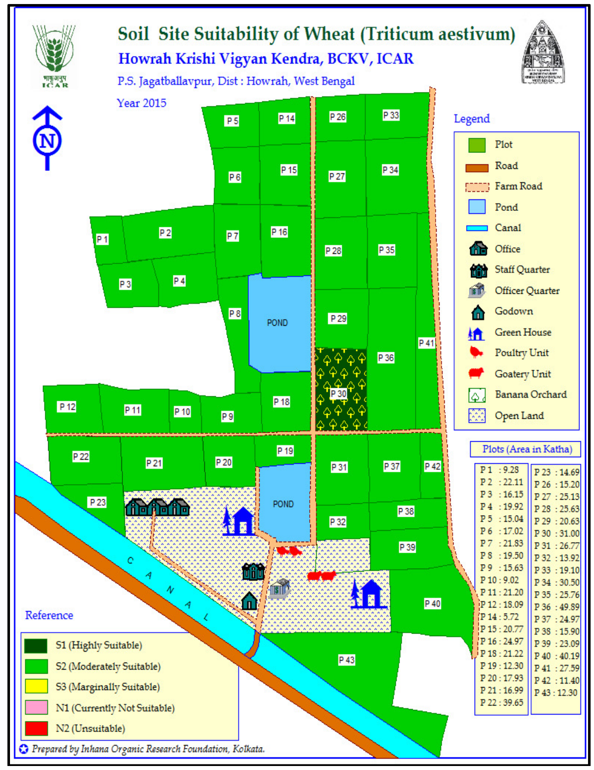

Figure 20: Soil Site Suitability of wheat

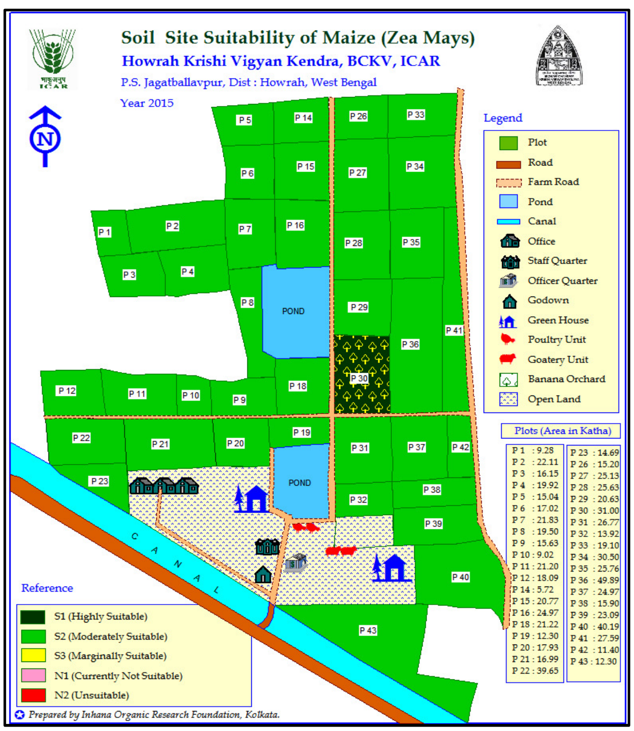

Figure 21: Soil Site Suitability of Maize

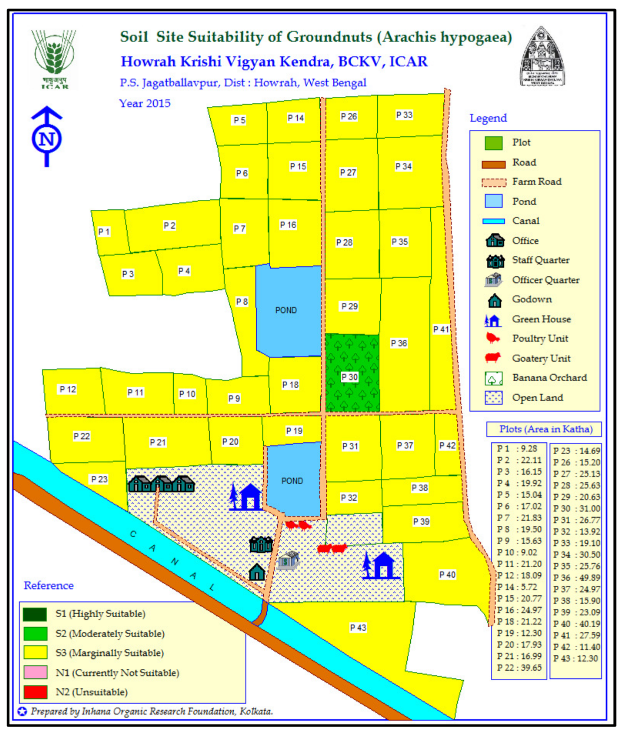

Figure 22: Soil Site Suitability of Groundnut

Soil Site Suitability of different crops at Agricultural farm under Howrah KVK (ICAR) / 2

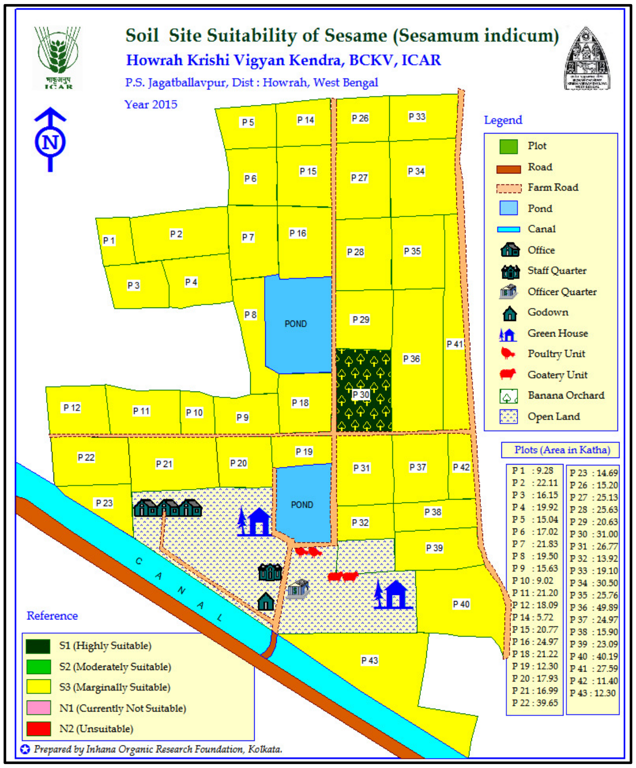

Figure 23: Soil Site Suitability of Sesame

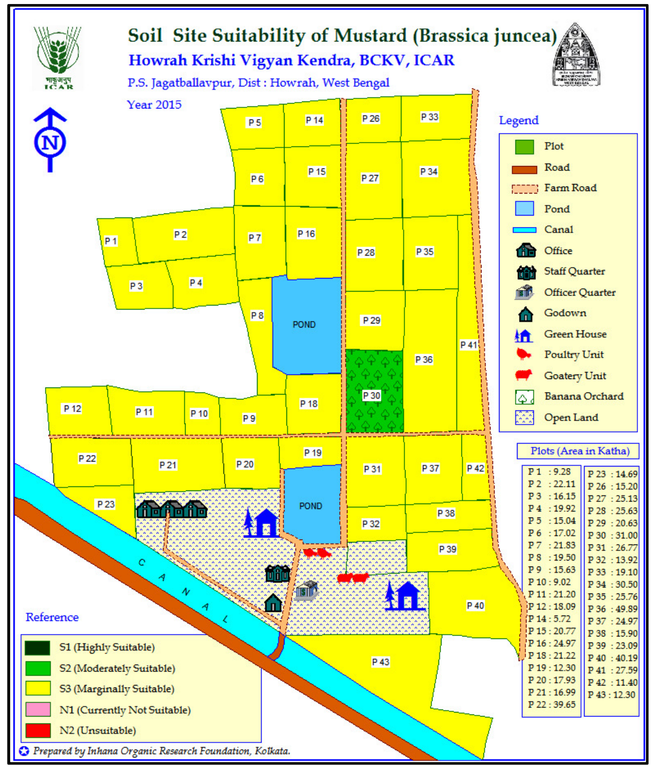

Figure 24: Soil Site Suitability of Mustard

Figure 25: Organically produced paddy and vegetables under Inhana Rational Farming Technology was demonstrated at Howrah KVK (ICAR) during Technology Week

Sl No	Class	Area	% TCA
Paddy (*Oryza sativa*)			
1	S1: Highly Suitable	787.00	96.21
2	S2: Moderately suitable	31.00	3.79
3	S3: Marginally Suitable	0.00	0.00
4	N1: Currently not suitable	0.00	0.00
5	N2: Permanently not suitable	0.00	0.00
Wheat (*Triticumaestivum*)			
1	S1: Highly Suitable	31.00	3.79
2	S2: Moderately suitable	787.00	96.21
3	S3: Marginally Suitable	0.00	0.00
4	N1: Currently not suitable	0.00	0.00
5	N2: Permanently not suitable	0.00	0.00
Maize (*Zea mays*)			
1	S1: Highly Suitable	31.00	3.79
2	S2: Moderately suitable	787.00	96.21
3	S3: Marginally Suitable	0.00	0.00
4	N1: Currently not suitable	0.00	0.00
5	N2: Permanently not suitable	0.00	0.00
Groundnut (*Arachishypogaea*)			
1	S1: Highly Suitable	0.00	0.00
2	S2: Moderately suitable	31.00	3.79
3	S3: Marginally Suitable	787.00	96.21
4	N1: Currently not suitable	0.00	0.00
5	N2: Permanently not suitable	0.00	0.00
Sesame (*Sesamumindicum*)			
1	S1: Highly Suitable	31.00	3.79
2	S2: Moderately suitable	31.00	3.79
3	S3: Marginally Suitable	787.00	96.21
4	N1: Currently not suitable	0.00	0.00
5	N2: Permanently not suitable	0.00	0.00
Mustard (*Brassica juncea*)			
1	S1: Highly Suitable	0.00	0.00
2	S2: Moderately suitable	31.00	3.79
3	S3: Marginally Suitable	787.00	96.21
4	N1: Currently not suitable	0.00	0.00
5	N2: Permanently not suitable	0.00	0.00

Table 3: Soil Site Suitability of Cereal and Oilseeds in Agricultural Farm, Howrah KVK (ICAR)

4. Conclusion

The performance of any crop is largely dependent on soil parameters. And because of changing climate and overuse of chemicals in agriculture, the soil is becoming the most affected victim. As a result, crop suitability to a particular soil site is changing. Hence, a study of soil-site characteristics for predicting the crop suitability of an area was needed. A demonstrative evaluation conducted in Howrah KVK farm revealed 80% of the farm soil to be poor and meager 20% to be of moderate quality (according to the SQI) after assessing soil texture, pH and other fertility and microbial status of the soil. Based on this assessment, soil site suitability of selected crops that can be grown for maximum outcome in that soil was done. This demonstration can provide guidance to the farmers as to which crops are suitable for a particular land parcel for profitable land use when performed in large scale basis.

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