SOIL TEST BASED FERTILITY EVALUATION AND NUTRIENT MANAGEMENT PLANS FOR KERALA

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General characteristics of soils of Kerala

- The State of Kerala falls in the humid tropical belt with high rainfall and temperature conditions conducive to intense weathering processes

- It the *type locality* of laterite and over 90 % of geographic area is covered by highly weathered laterite soils

- In general, the soils are acidic, kaolinitic, gravelly with low cation exchange capacity, inherently poor in bases and plant nutrients, low water holding capacity and high phosphorus fixation

Intensive agriculture and the use of high analysis fertilisers with greater purity resulted in depletion of secondary and micronutrients

Continuous downward slide in crop production has been a matter of serious concern

Soil test based nutrient management is the need of the hour

❖ Soil testing is a proven diagnostic tool to evaluate the available nutrient status of a soil and evolve a balanced fertiliser recommendation for crops

❖ Soil testing programme initiated in 1957 in Kerala was mainly intended to create an awareness on the use of fertilisers to maximise yield with thrust on major nutrients

❖At present wide net work of stationary and mobile laboratories are functioning in all the districts with facilities for testing major,secondary and micronutrients

Soil Testing Laboratories in the State

Sl.No.	Department /Institutions	Ownership	Number
1.1	DSTL	GOK	15
1.2	Mobile Labs	GOK	9
2	Kerala Soil Survey Organisation	GOK	4
3	KVK	KAU	5
		ICAR	4
		NGO	3
4	UPASI	NGO	2
5	FACT	GOI	1
6	ICAR-Institute-IISR, Kozhikode	GOI	1
7	Rubber Research Institute of India	GOI	1
8	Rubber Board Regional Labs	GOI	8
8	Indian Cardamom Research Institute	GOI	1
9	Kerala Forest Research Institute	GOK	1
10	Kerala Agricultural University	KAU	10
	Total		65

❖ The State Planning Board has coordinated a pilot project as part of Rashtriya Sam Vikas Yojana in 42 paddy growing Panchayats of Palakkad district during 2004-07

❖ More than 50,000 soil samples were collected and analyzed for major, secondary and micro nutrients

❖ Results indicated wide spread deficiencies of micro nutrients (Zinc and Boron) in a number of panchayats

❖ The need for the analysis of soil samples for pH, OC, P, K, Ca, Mg, S, Cu, Zn and B to formulate panchayat wise nutrient management plans was realized

❖ Based on the results from the pilot study, the State Planning Board initiated a project on "Soil Based Plant Nutrient Management Plan for Agro-Ecosystems of Kerala" in 2010

❖ The project implemented by the Department of Agriculture was organized as a multi-institutional Project of the State and Central institutions involved in agricultural research and development in the State under the leadership of NBSS & LUP, Bengaluru

❖ State Planning Board co-ordinated the project

Soil Based Plant Nutrient Management Plan for Agro-Ecosystems of Kerala

Objectives

- Collection of 2 lakhs soil samples from all the panchayats of the state representing the major land use systems
- Analysis of soils for macro, secondary and micro nutrients (N, P, K, Ca, Mg, S, B, Fe, Mn, Cu and Zn) EC and soil reaction (pH)
- Development of application software for data storage, management and retrieval
- Interpretation of soil analysis data, formulation of fertilizer recommendations and generation of soil health cards
- Preparation of Nutrient management plan for all the panchayats, blocks and districts

Implementation of the Project

- Soil samples were analyzed in 27 laboratories under the various collaborating institutions
- To ensure quality of analysis these labs were provided with a manual of procedures on soil sampling and analysis
- Farmer and crops details of each sampled area and the corresponding analytical results were input by the collaborating institutions/laboratories
- An online facility developed for the project by the IIITM-K, Thiruvananthapuram, enabled input of data to a central server located in the institute

Continued ...

- The initial process was to capture the relevant data through an online interface for all collaborating laboratories and generate a unique sample code and farmer ID (eg. **TVM/NYK/CKL/85-7/77**)
- The collected data has been validated by expert soil scientists
- The processed data is passed on to generate fertilizer recommendation and nutrient management advisory in the form a soil health card for distribution to the farmers
- Soil analytical data were used to prepare Nutrient Management Plans for panchayat, block and district

Participating Institutions

- Department of Agriculture, Kerala
- DST laboratories, CSPHC

ICAR Institutes

- NBSS&LUP, Bengaluru,
- CTCRI, Thiruvananthapuram,
- CPCRI, Kayamkulam,
- IISR, Kozhikode
- Kerala Agricultural University (COA-V, COA-P,OARS-K,RRS-V, RRS-M, RARS-K,RTL,RARS-P, KVK-W.PRS-P)
- KFRI-Peechi
- ICRI (Spices Board)
- IIITM-Kerala
- NCESS,Thiruvananthapuram
- Kerala State Planning Board

Special features of the project

- The multi-institutional collaboration brought together planners, research scientists and officers of the Department of Agriculture to address a serious concern of the state
- Twenty seven laboratories and 13 institutions from the Central and State Government were part of the programme
- Testing of soils for secondary and micro nutrients apart from major nutrients, pH and EC
- Extensive use of Information and Communication Technology for soil test data transmission, storage, analysis and automated processing, to generate soil test advisories for the farmers

Nutrient Management Plans

A nutrient management plan (NMP) outlines the amount (rate), source, placement (method of application), and timing of fertilizer application /lime based on soil test to maximize crop production with minimum impact on environment

Nutrient Management Plans have been prepared for Panchayats, Blocks and District covering the entire state

Benefits of NMP

- Helps farmers to apply fertilizers and lime, based on soil test and need of the crops
- Prevents excessive application of fertilizers especially N and P causing pollution of water bodies/ground water and maintains soil health
- Potential cost savings in inputs, balanced supply of nutrients and improved crop performance
- Improves nutrient use efficiency and provides balanced supply of nutrients
- NMP has to be periodically revised and modified according to farmers needs, growing season, change in cropping pattern etc.
- It can be used for planning fertilizer needs of the Panchayat, Block, District and the State as a whole

COMPONENTS OF NMP

- Content of nutrients present in the soil
- Amount of lime and fertilizers needed to provide balanced nutrient supply
- Accounting for all potential sources of nutrients used as inputs, form of manures/legumes, in addition to fertilizers
- Recommendation for manures, fertilizers and forms, time and method of application to increase use efficiency
- Site management to minimize nutrient losses through surface and ground water
- Maintain records of soil test data and nutrient management practiced

Preparation of NMP

Nutrient Management Plan has been prepared based on soil test data of:

pH, EC, OC, Av.P, Av.K, Ca, Mg, S, Fe, Mn ,Cu, Zn and B

Fe and Mn recommendations are not normally required for Kerala soils

SOIL REACTION (pH) CLASSES

Classes	pH range	Lime (kg/ha)
1. Ultra acid	<3.5	1000
2. Extremely acid	3.5 -4.4	850
3. Very strongly acid	4.5- 5.0	600
4. Strongly acid	5.1-5.5	350
5. Moderately acid	5.6-6.0	250
6. Slightly acid	6.1-6.5	100
7. Neutral	6.6-7.3	
8. Slightly alkaline	7.4-7.8	
9. Moderately alkaline	7.9-8.4	
10. Strongly alkaline	8.5 -9.0	
11. Very strongly alkaline	>9.0	

Soil analysis data (organic carbon, available P and K) were grouped as low, medium or high as per the soil fertility rating followed in the S T L under the DOA. Based on the above rating, frequency distribution of OC, P and K was worked out. Nutrient Index computed based on the data

Soil parameters	Low	Medium	High
Organic carbon (%)	≤ 0.7	> 0.7 - ≤1.5	> 1.5
Available P (kg ha^{-1})	< 11	≥ 11 - ≤24	> 24
Available K (kg ha^{-1})	< 116	≥ 116 - ≤ 275	> 275

Nutrient Index (Parker *et al.*,1951)

$$\text{Nutrient Index} = \frac{(N_l \times 1) + (N_m \times 2) + (N_h \times 3)}{N_t}$$

where, N_l - Number of samples in low category,

Nm- Number of samples in medium

N_h - Number of samples in high category

N - Total number of samples

Nutrient index classes

Low : < 1.5 ; 1.5 -2.5 ; High : > 2.5

Based on the nutrient index, fertilizer recommendation (NPK) is given as the percentage of general recommendation now being followed by the STL, Kerala

Secondary nutrients (Ca, Mg & S)

Soil analysis data of secondary nutrients were grouped as adequate / deficient based on the critical levels given below (KAU, 2012)

Nutrients	Deficiency	Adequate
Calcium	≤ 300 mg kg^{-1}	> 300 mg kg^{-1}
Magnesium	≤ 120 mg kg^{-1}	> 120 mg kg^{-1}
Sulphur	< 5 mg kg^{-1}	≥ 5 mg kg^{-1}

Micro nutrients (Cu, Zn & B)

Soil analysis data of micro nutrients were grouped as adequate / deficient based on the critical levels given below (KAU, 2012)

Nutrients	Deficiency	Adequate
Copper	< 1.0 mg kg^{-1}	≥ 1.0 mg kg^{-1}
Zinc	< 1.0 mg kg^{-1}	≥ 1.0 mg kg^{-1}
Boron	< 0.5 mg kg^{-1}	≥ 0.5 mg kg^{-1}

Nutrient Management Plan
Pozhuthana Grama Panchayat

Block- Kalpetta

District- Kasaragod

No. of panchayat wards : 13
Total Area (ha): 7130
Cropped Area (ha): 7029

AEU: Northern High Hills agro-ecological unit

Climate: Tropical humid monsoon type with mean annual rainfall of 3460 mm and mean annual temperature of 26.2 ° C with a dry period of around four months

Soils: The hilly terrain has deep, well drained strongly acid, organic matter rich, clay soils. The valleys have deep, imperfectly drained acid clay soils

Crops: Coffee is the major crop followed by tea, areca nut, banana, pepper, coconut, cardamom, rubber and tapioca

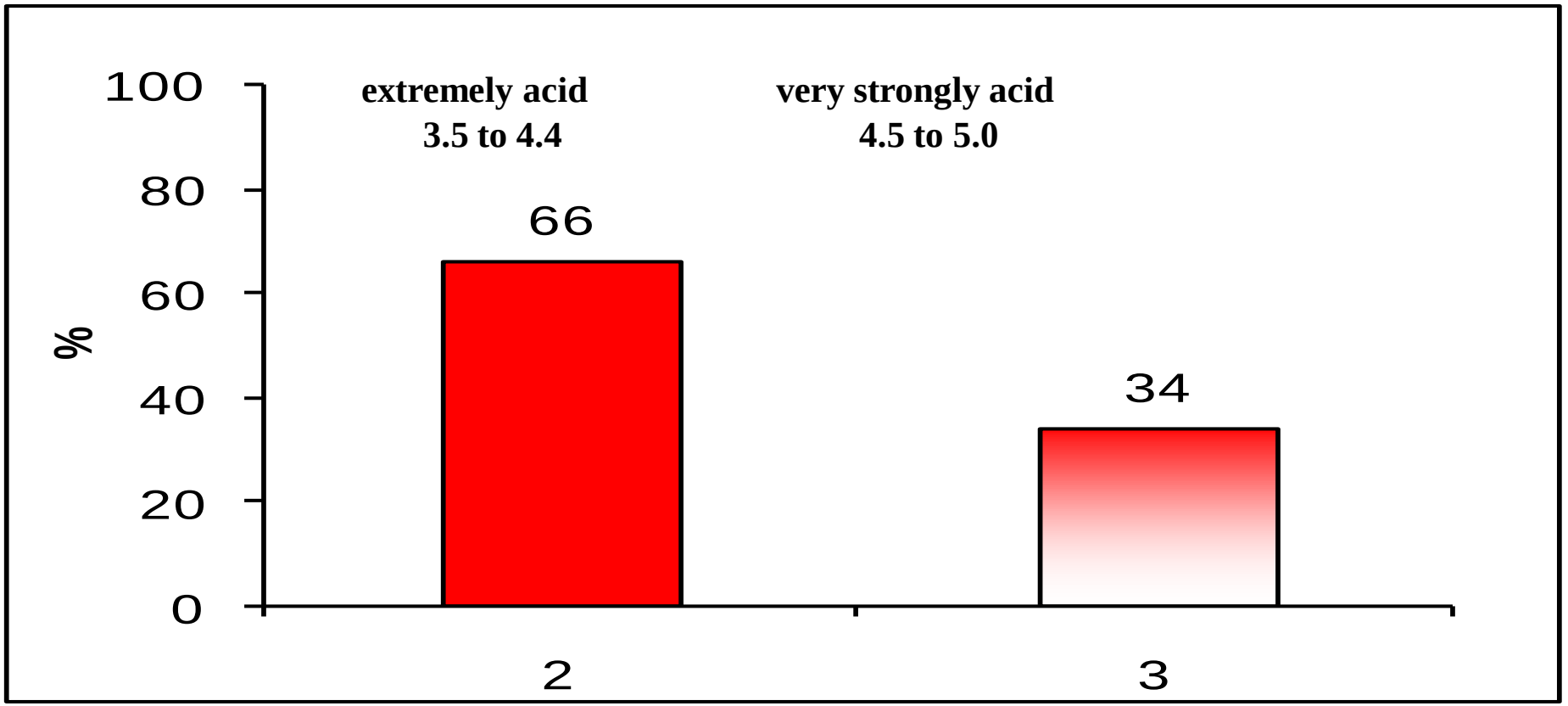
Composite surface soil samples (0-20 cm) were collected from 325 farmer's fields, well distributed in the panchayat and representing the major land use systems

Samples were tested for pH, EC, OC, P, K, Ca, Mg, S, Fe, Mn, Cu, Zn and B at Krishi Vigyan Kendra, Wayanad as per methods suggested by Sureshkumar et al. (2010)

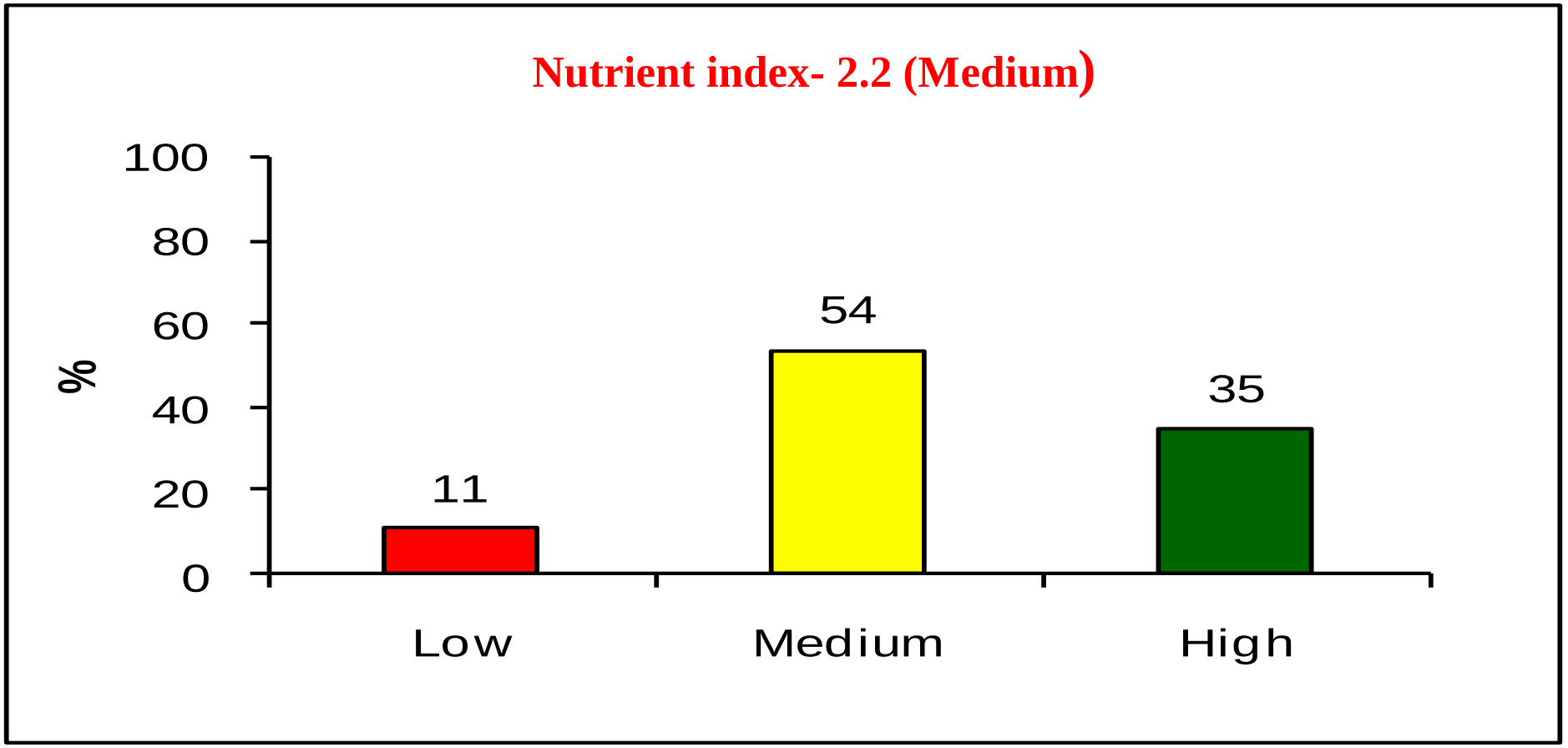
Soil analysis results are interpreted considering soil fertility ratings and NMP prepared for computing fertilizer recommendation for the panchayat

The salient features of the soil test results of the panchayat are:

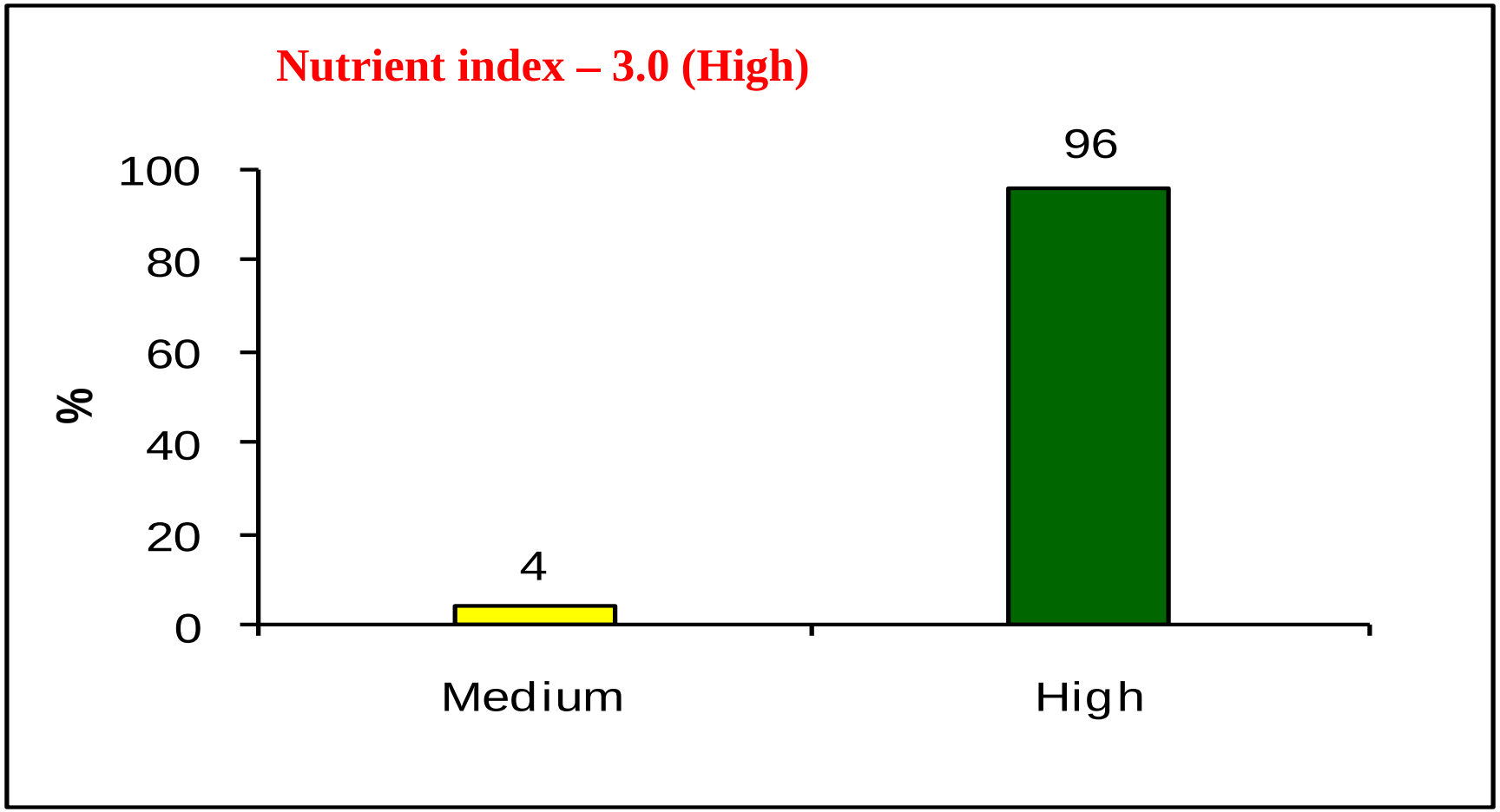
Frequency distribution of soil reaction (pH) classes



Frequency distribution of organic carbon classes

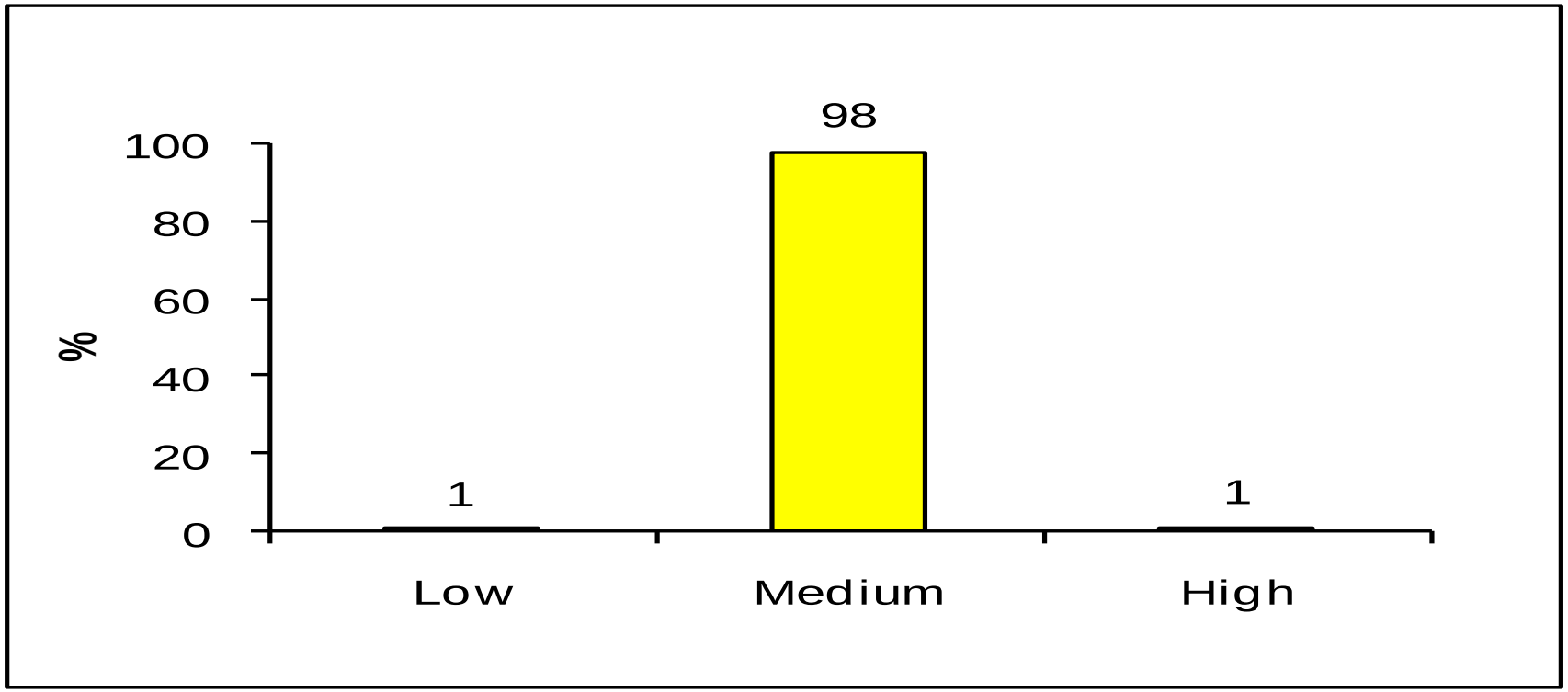


Frequency distribution of available phosphorus classes



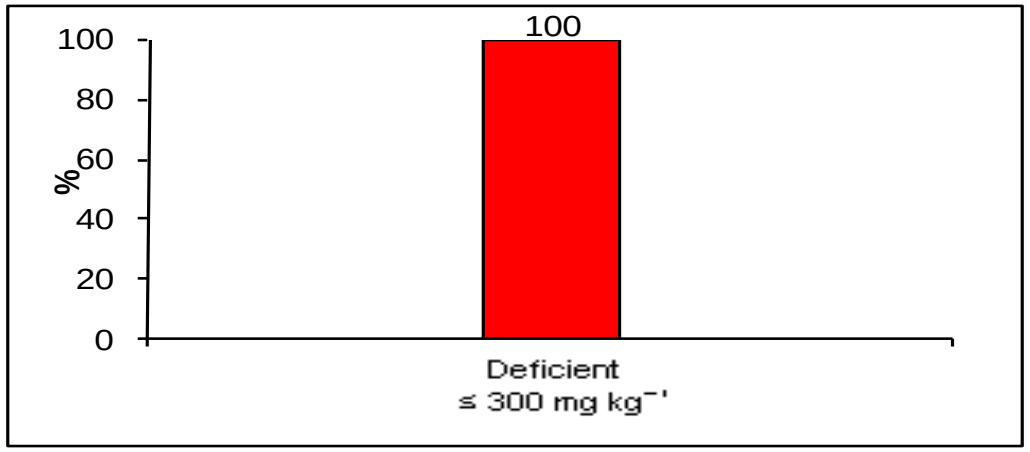
Frequency distribution of available potassium classes

Nutrient index- 2.0 (Medium)

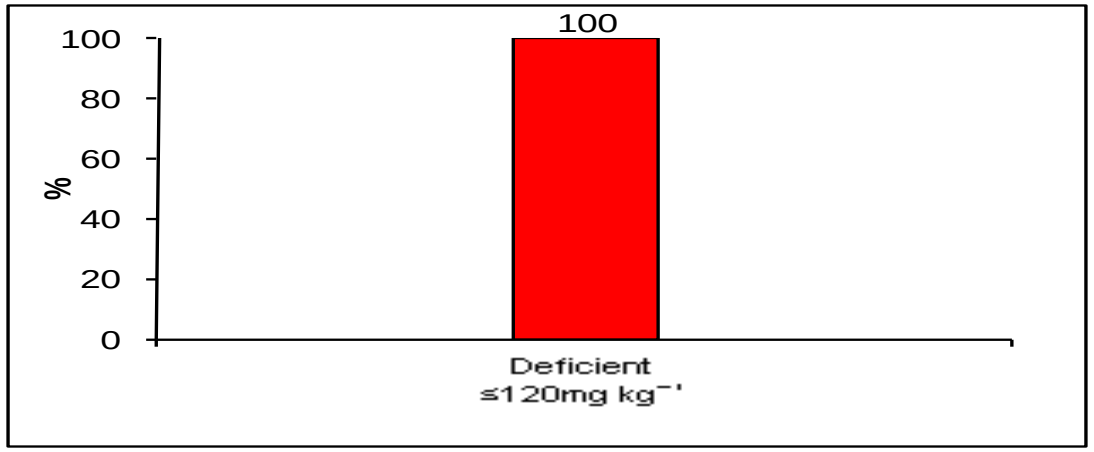


Frequency distribution (%)

Calcium



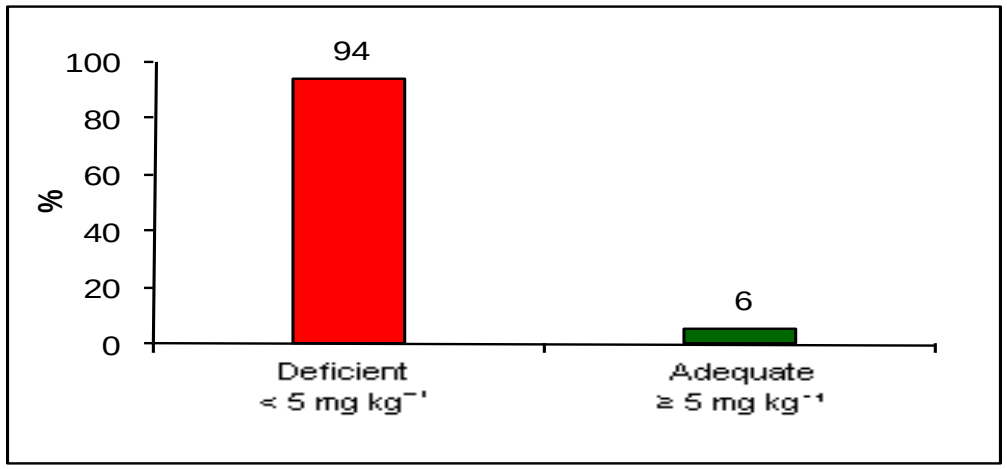
Magnesium



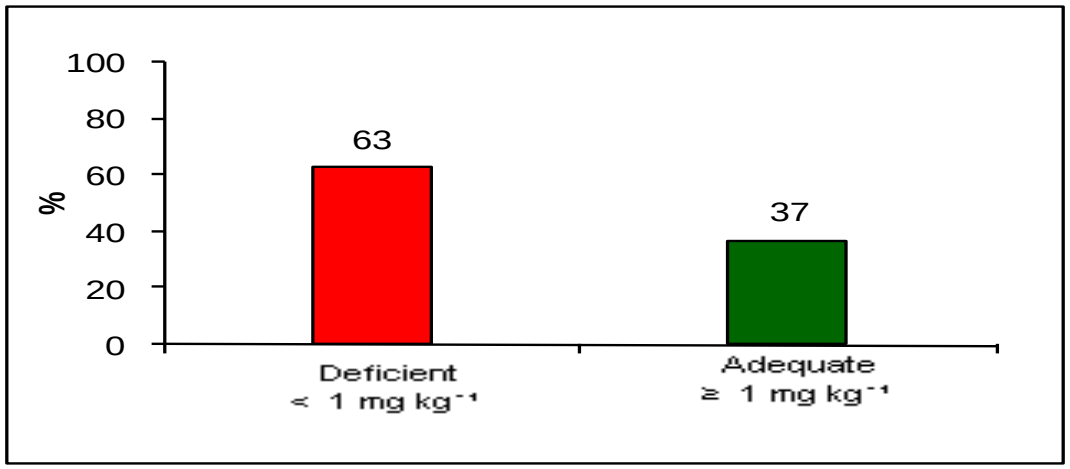
(NB: Percentage of samples in adequate class ≥ 70 indicates sufficiency level of the nutrient in the panchayat)

Frequency distribution (%)

Sulphur



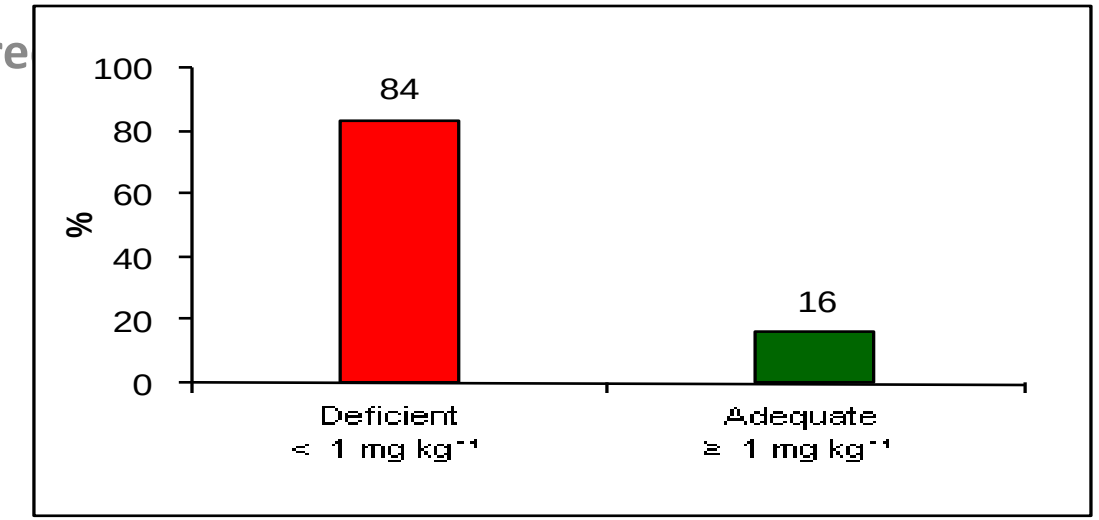
Copper



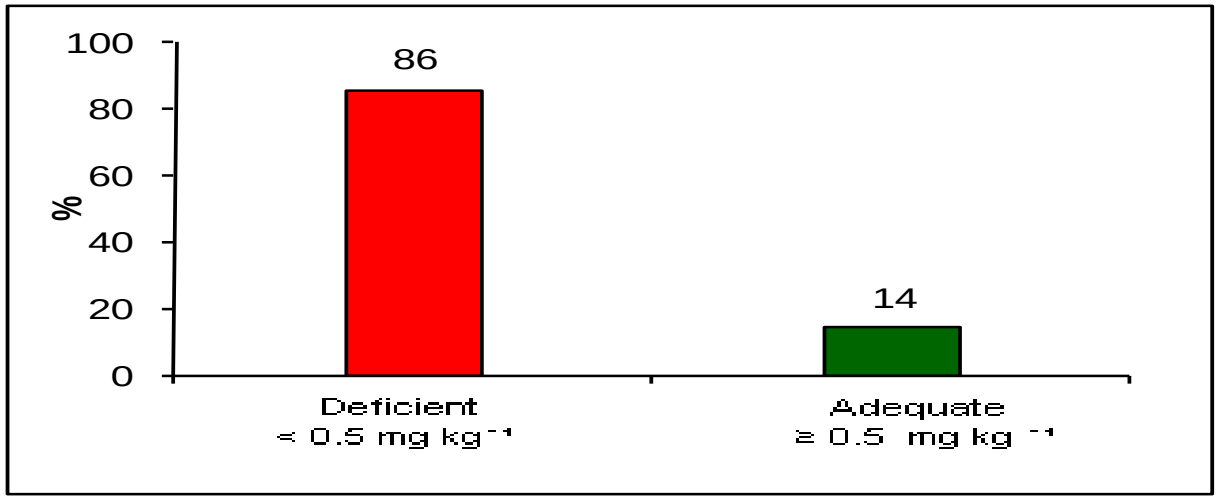
(NB: Percentage of samples in adequate class ≥ 70 indicates sufficiency level of the nutrient in the panchayat)

Frequency distribution (%)

Zinc



Boron



(NB: Percentage of samples in adequate class ≥ 70 indicates sufficiency level of the nutrient in the panchayat)

Soil Test Results- Salient Features

- The soils are extremely acid to very strongly acid with overall pH ranging from 3.5 to 5.0
- Organic carbon is medium in soil samples with content ranging from 0.8 to 1.5 per cent. It indicated medium level of plant available nitrogen in soils
- Available phosphorus is high in soil samples with values greater than 24 kg ha^{-1}
- Available potassium is medium in soil samples with content ranging from 116 to 275 kg ha^{-1}
- Calcium is deficient in all the soil samples with content less than 300 mg kg^{-1}
- Magnesium is deficient in all the soil samples with content less than 120 mg kg^{-1}

Salient features (contd...)

- Sulphur is deficient in 94 % of soil samples with content less than 5 mg kg^{-1}
- Copper is deficient in soil samples with content less than 1 mg kg^{-1}
- Zinc is deficient in 84 % of soil samples with content less than 1 mg kg^{-1}
- Boron is deficient in 86 % of soil samples with content less than 0.5 mg kg^{-1}

Soil fertility status and suggestions- Pozhuthana panchayat

Parameter	Status	Recommendation/suggestion
pH	Very strongly to strongly acid (pH 4.5-5.5)	Calcium carbonate @ 750 kg ha^{-1}
Organic carbon	Medium	100 % POP
Available P	High	75 % POP
Available K	Medium	100% POP
Calcium	Deficient	Lime application
Magnesium	Deficient	$MgSO_4$ @ 80 kg ha^{-1}
Sulphur	Deficient	Supply through $MgSO_4$
Copper	Deficient	$CuSO_4$ @ 2 kg ha^{-1} or foliar spray (0.5 %)
Zinc	Deficient	$ZnSO_4$ @ 20 kg ha^{-1} or foliar spray (0.5 %)
Boron	Deficient	Borax @ 10 kg ha^{-1} or foliar spray (0.5 %)

NB: Organic manure as per POP

Soil Based Plant Nutrient Management Plan for Block Panchayat

- The database generated for each panchayat of the Block formed the basis for the preparation of BNP
- BNP is a reference material for guiding the agricultural officers on the crop based nutrient management strategies, helpful in computation of fertilizer requirement at the Block level
- Also useful for discussions at the farmer level, farmer's advisory committees, block level federated organizations and farmer extension organizations on nutrient management
- Discussion with fertilizer dealers and in the preparation of advisories under ATMA and Crop Health Management programs

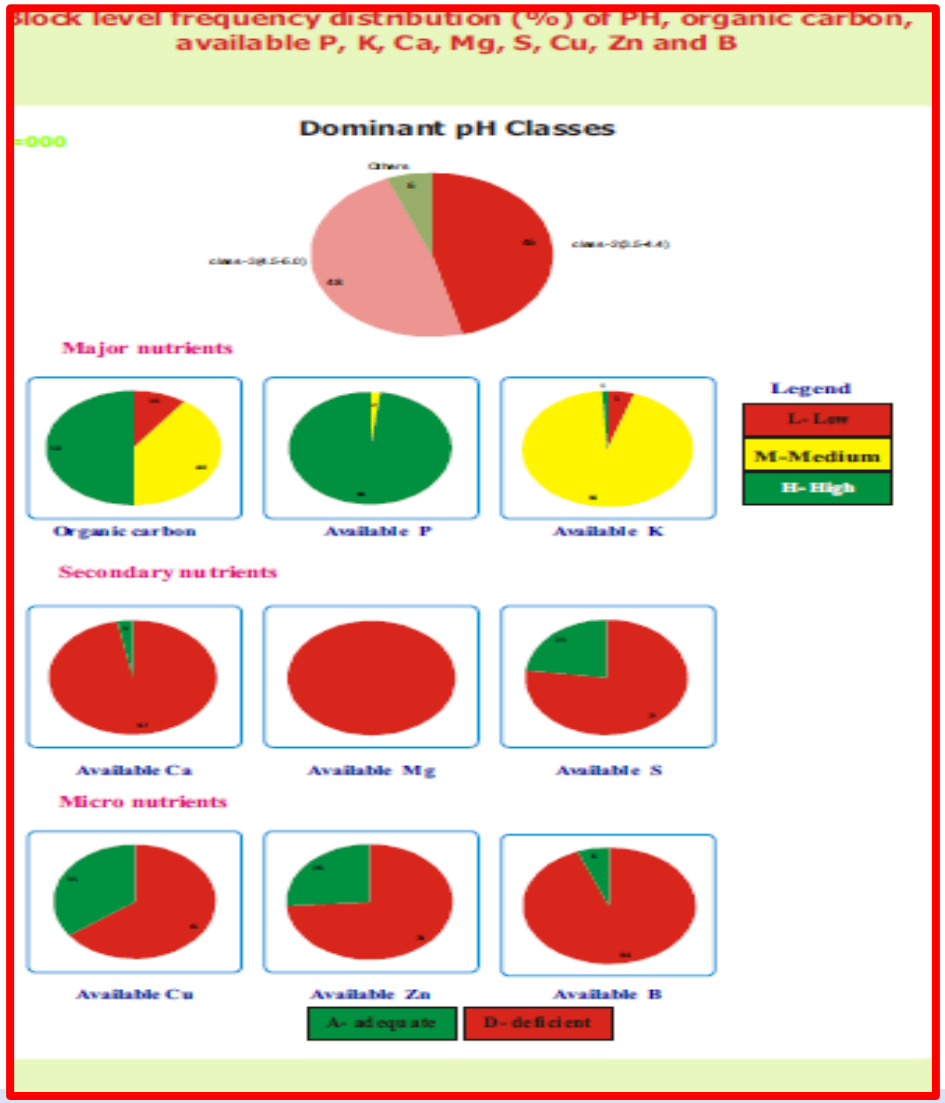
BNP- Kalpetta Block

❖Analytical results of 1148 soil samples collected from farmer's fields of 9 panchayats in Kalpetta Block were the dataset

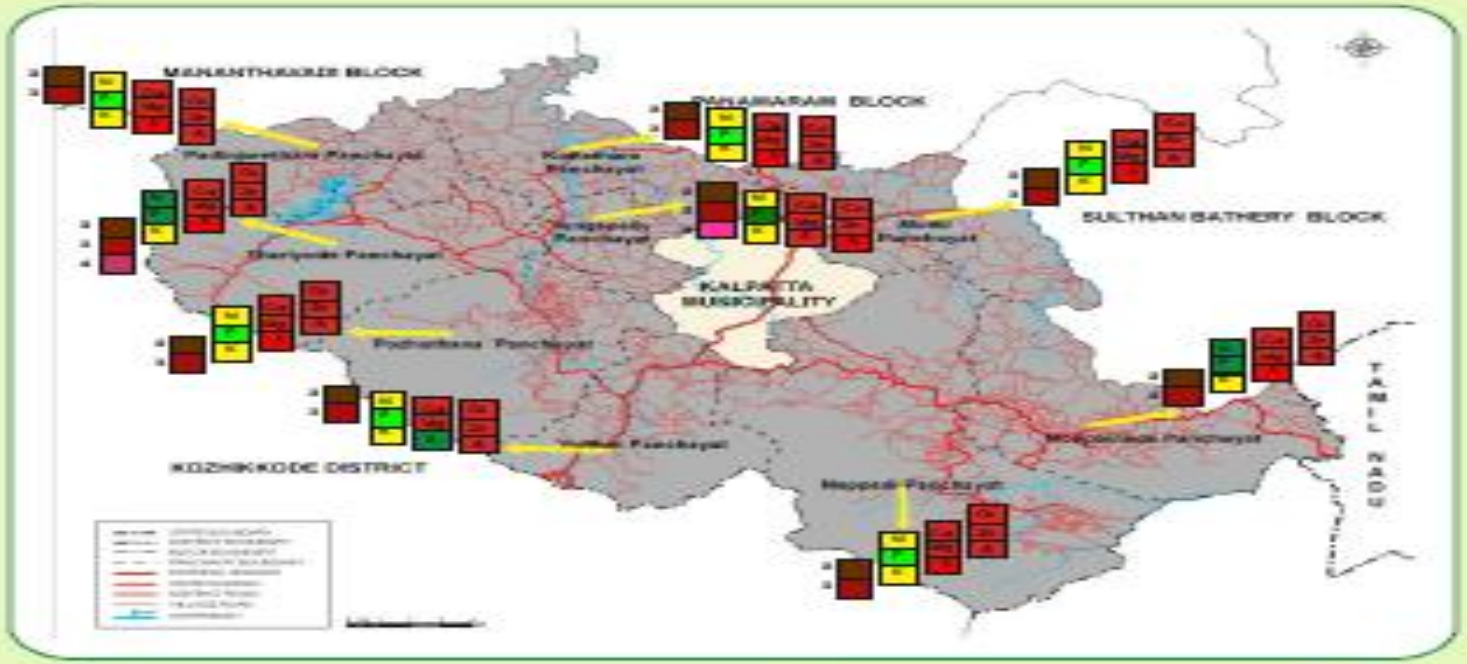
❖Information gathered from panchayat NMP were utilized for elucidating fertility status of the Block

❖ Soil test data were pooled and Block level frequency distribution of pH classes, organic carbon, available P, K, Ca, Mg, S, Cu, Zn and B were worked out

Frequency distribution of soil fertility parameters- Kalpetta block



SOIL FERTILITY STATUS - KALPETTA BLOCK



Highlights of soil fertility status of Kalpetta Block

Parameter	Status
pH	Extremely acid to very strongly acid (pH 3.5 to 5.0) – 95 %
Organic carbon	Medium (40 %) , high (50 %)
Available P	High (98 %)
Available K	Medium (94 %)
Calcium	Deficient (97 %)
Magnesium	Deficient (100 %)
Sulphur	Deficient (77 %)
Copper	Deficient (65 %)
Zinc	Deficient (74 %)
Boron	Deficient (94 %)

Panchayat wise soil fertility - 9 panchayats

- More than 50 % of soils of Kottathara, Vythiri, Pozhuthana, Padinjarathara panchayats are extremely acid (pH 3.5 to 4.4)
- More than 50 % of soils of Muttil, Meppadi and Muppainadu panchayats are very strongly acid (pH 4.5 to 5.0)
- Soils of Vengappally and Thariyode panchayats vary from extremely acid to strongly acid (3.5 to 5.5)
- Soils of Vythiri, Muttil and pozhuthana panchayats are medium in organic carbon
- Organic carbon content of soils of Kottathara, Vengappally, Thariyode, Meppadi and Muppainadu panchayats is high
- Soils of all the panchayats are high in available P
- Soils of all the panchayats are medium in available K

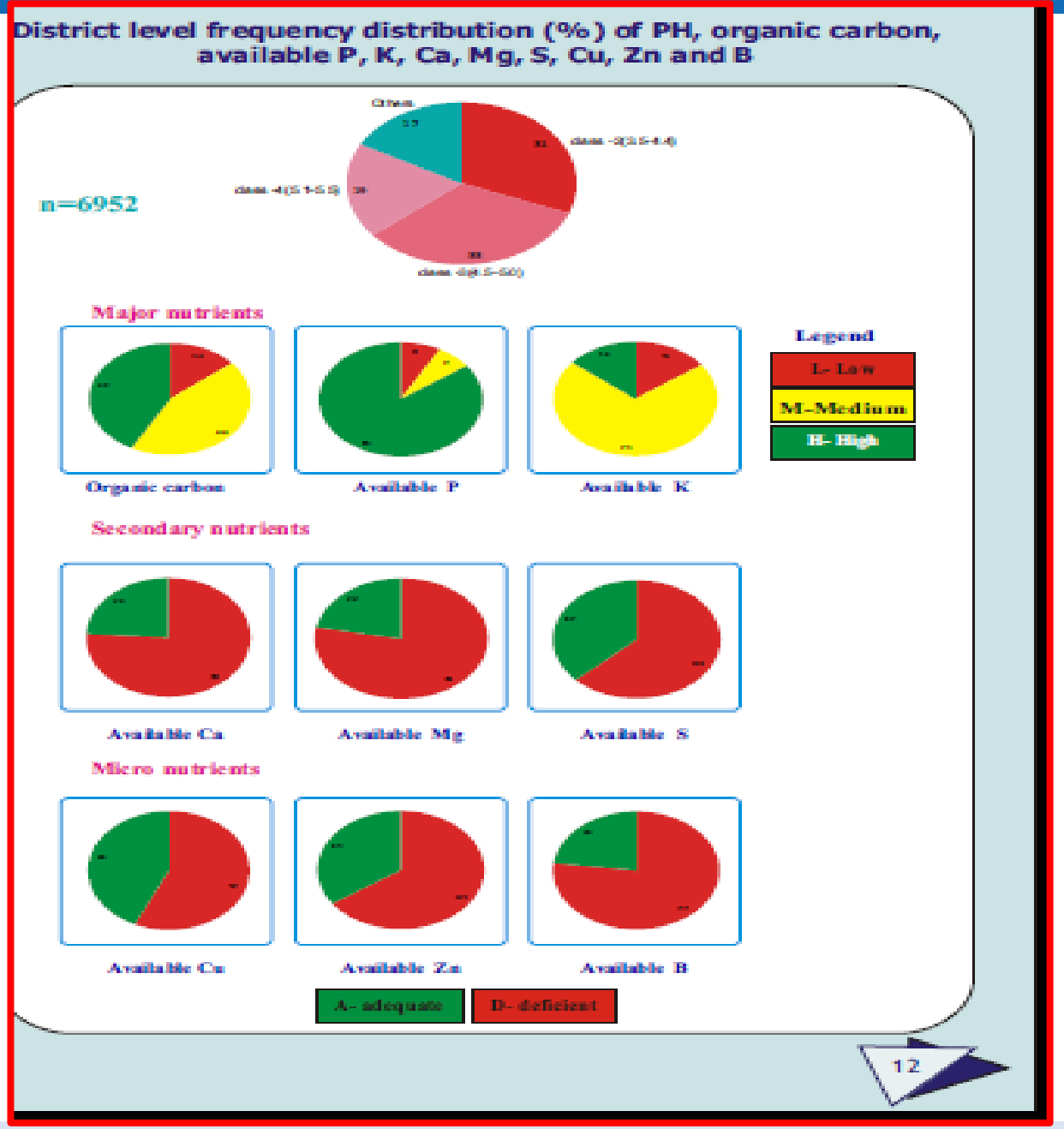
Continued...

- Calcium is deficient in soils of all the panchayats
- Magnesium is deficient in soils of all the panchayats
- Sulphur is deficient in soils of all the panchayats except Vythiri
- Copper is deficient in soils of all the panchayats
- Zinc is deficient in soils of all the panchayats
- Boron is deficient in soils of all the panchayats

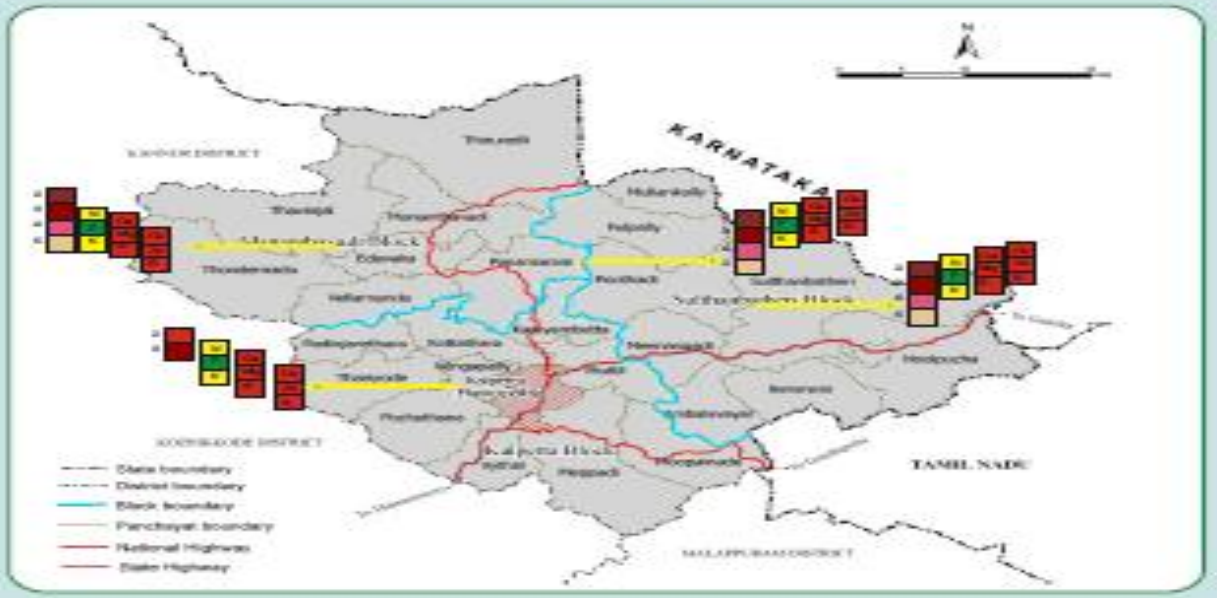
District Nutrient Management Plan (DNP)

- Database generated for each panchayat and Block formed the basis for the preparation of DNP
- The soil analytical data of 6952 soil samples from 25 panchayats in Wayanad District has been used for the preparation of DNP
- This document is prepared as a reference material for guiding the agricultural officers for arriving at district level projections on soil fertility and has the same uses as the BNP

Parameter	Soil fertility status-Wayanad District
pH	❖Majority of soils (64%) -- extremely acid to very strongly acid (pH 3.5 to 5.0) (pH class 2 and 3)
Organic carbon	Medium (44 %) & High (42 %)
Available P	High (85 %)
Available K	Medium (71 %)
Calcium	Deficient (76 %)
Magnesium	Deficient (78 %)
Sulphur	Deficient (63 %)
Copper	Deficient (57 %)
Zinc	Deficient (65 %)
Boron	Deficient (77 %)


District level frequency distribution (%) of PH, organic carbon, available P, K, Ca, Mg, S, Cu, Zn and B
n=6952
Major nutrients
Organic carbon
Available P
Available K
Legend
L- Low
M-Medium
H- High
Secondary nutrients
Available Ca
Available Mg
Available S
Micro nutrients
Available Cu
Available Zn
Available B
A- adequate
D- deficient
12

SOIL FERTILITY STATUS - WAYANAD DISTRICT



pH Class	
3	Very strongly acid
4	Strongly acid
5	Moderately acid
6	Slightly acid

Major nutrients	
Medium	High
Secondary and micro nutrients	
Deficient	Adequate

20

Block wise comparison of soil fertility status

Parameter	Kalpetta	Panamaram	Sulthan Bathery	Mananthavady
pH	3.5-5.0	3.5-5.0	3.5-5.5	3.5-5.5
OC	Medium	Medium	Medium	Medium
Av. P	High	High	High	Medium
Av. K	Medium	Medium	Medium	Medium
Ca	D	D	D	D
Mg	D	D	D	D
S	D	D	D	D
Cu	D	D	D	D
Zn	D	D	D	D
B	D	D	D	D

D-Deficient

- Nutrient management plan of the District, Block and Panchayat gives only the overall status of soil fertility of the District, Block and Panchayats

- For site-specific fertilizer recommendation, analysis of soil sample from individual field is more beneficial and economical

Key achievements of the project

- Analysed about 2 lakhs soil samples for pH, EC, macro, secondary and micro nutrients (Phase I)
- Distributed 2 lakhs Soil Health Cards to farmers
- Issued NMP for 1058 local bodies
- Prepared and distributed 1058 posters of NMP for display in Krishi Bhavans
- Developed online data input and transfer to soil testing laboratories and software for automated plant nutrient recommendations and soil health card printing
- Released *ad hoc* recommendations for management of secondary and micro nutrients by KAU (2012)
- Developed a portal *www.keralasoilfertility.net*

(Continued ...)

- Revised Laboratory Manual for testing soil, water, plant and organic manure samples for Soil testing labs
- Adoption of panchayats, 2 each in a district for popularizing soil testing and demonstration of crop productivity improvement achievable through soil fertility management
- Special soil testing component for vegetable and banana growing areas by VFPCK
- Micro-nutrient demonstrations in vegetables initiated in about 450 clusters
- Vegetable clusters were entrusted with campaign on soil testing so as to build ownership of the project at panchayat level

(Continued ...)

- Human resource development and capacity building programmes initiated for technical staff in soil testing labs
- Modernization of Soil testing labs
- Scheme for Monitoring and follow up of Soil Health Cards utilization
- Farmers field experiments on integrated soil test based nutrient management by students of the Plant Health Management Diploma Programme.
- Integration of project outputs with ATMA for extension of the project outcomes

Publications

Nutrient Management Plans Booklets

1 Panchayat Nutrient Management Plan -1058

2 Block Nutrient Management Plan -152

3 District Nutrient Management Plan -14

4 Panchayat Nutrient Management Plan Posters (English and Malayalam) 1058

Books

4 Soil Fertility Assessment and Information Management for Enhancing Crop Productivity in Kerala

5 Soil Health Management for Sustainable Crop Production in Kerala

6 Soil Fertility Hand Book

7 Manual on Soil, Plant and Water Analysis

8 Organic Manure Analysis

Reference

Kerala State Planning Board ,2017, Soil Fertility Assessment and Information Management for Enhancing Crop Productivity in Kerala, State Planning Board, Thiruvananthapuram, pp 514

Soil Health Card

ജൈവകൃഷി

- രാസവളങ്ങളും രാസകീടനാശിനികളും പൂർണ്ണമായി ഒഴിവാക്കി മണ്ണിന്റെ ആരോഗ്യവും പരിസ്ഥിതി സംരക്ഷണവും ലക്ഷ്യമാക്കിയുള്ള വിള പരിപാലനരീതിയാണ് ജൈവ കൃഷി
- കൃഷിയിടങ്ങളിൽ തന്നെയുള്ള വസ്തുക്കളെ ഉപയോഗപ്പെടുത്തിയും മണ്ണിന്റെ ഘടനയെ ബാധിക്കാത്ത രാസവസ്തുക്കളെ ഒഴിവാക്കിയുള്ള വളപ്രയോഗമാണ് ജൈവകൃഷിയിൽ നടത്തുന്നത്
- മണ്ണു പരിശോധനയുടെ അടിസ്ഥാനത്തിൽ മണ്ണിൽ സൂക്ഷ്മ മൂലകങ്ങൾ ആവശ്യത്തിൽ കുറവാണെങ്കിൽ ജൈവകൃഷിയുടെ ദേശീയപരിപാടി (NPOP) മാർഗ്ഗനിർദേശം അനുസരിച്ച് സൂക്ഷ്മ മൂലകങ്ങൾ അടങ്ങിയ രാസവളങ്ങൾ വിളപരിപാലനത്തിന് ഉപയോഗിക്കാവുന്നതാണ്

(വിശദ വിവരങ്ങൾക്ക് അടുത്തുള്ള കൃഷി ഓഫീസറുമായി ബന്ധപ്പെടുക)

പ്രധാനമൂലകങ്ങളുടെ അപര്യാപ്തത ചെടികളിൽ ഉളവാക്കുന്ന ലക്ഷണങ്ങൾ

പാക്യജനകം (നൈട്രജൻ)

- പ്രായമായ ഇലകളിൽ ഇളംപച്ചയോ മഞ്ഞയോ നിറവ്യത്യാസം. പിന്നീട് ഇലയാകെ മഞ്ഞ നിറമാകുന്നു
- പൂക്കളും കായ്കളും കുറയുന്നതുമൂലം വിളവ് കുറയുന്നു

ഭാവഹം (ഫോസ്ഫറസ്)

- കടുംപച്ചനിറം പ്രായമായ ഇലകളിൽ ആദ്യലക്ഷണമായി കാണുന്നു. ചെടിയുടെയും വേരുകളുടേയും വളർച്ച മുരടിക്കുകയും ശാഖാ മൂകുളങ്ങളുടെ വളർച്ച കുറയുകയും ചെയ്യുന്നു
- ഇലകൾ ചെമ്പിക്കുകയും അരികുകളിലും തുമ്പിലും നിറവ്യത്യാസവും കാണുന്നു

ക്ഷാരം (പൊട്ടാസ്യം)

- പ്രായമായ ഇലകളുടെ അരികുകൾ മഞ്ഞനിറമാകുന്നത് ആദ്യലക്ഷണം. പിന്നീട് അഗ്രഭാഗം തവിട്ടു നിറമായി കരിഞ്ഞ് ഉണങ്ങുന്നു
- കായ്കളും വിത്തുകളും ചുക്കി ചുളുങ്ങുന്നു

കേരള സർക്കാർ
കൃഷി വകുപ്പ്

മണ്ണിന്റെ ആരോഗ്യ സൂചികയും പരിപോഷണത്തിനുള്ള നിർദേശങ്ങളും

SOIL HEALTH CARD
And
NUTRIENT MANAGEMENT RECOMMENDATION

കർഷകന്റെ പേര്	: Venugopal T P
സാമ്പിൾകോഡ്	: ALP/CHR/PRB/48/19/230693

മേൽവിലാസം
Thottakathu Perumbalam P O
Perumbalam
Alappuzha

A multi-institutional project of Kerala State Department of Agriculture involving DST Laboratories, CSPHC, ICAR Institutes (NBSS&LUP, Bengaluru, CTCRI, Thiruvananthapuram, CPCRI, Kayamkulam, IISR, Kozhikkode), Kerala Agricultural University (COA-V, COA-P, OARS-K, RRS-V, RRS-M, RARS-K, RTL, RARS-P, KVK-W, PRS-P), KFRI-Peechi, ICRI (Spices Board), IIITM-Kerala and CESS- Thiruvananthapuram and Coordinated by Kerala State Planning Board.

വളപ്രയോഗ ശുപാർശ

വിള I.ചീര (കി.ഗ്രാം/ഏക്കർ)

	ജൈവവളം കി.ഗ്രാം	കമ്മായം കി.ഗ്രാം/ഏക്കർ	യൂറിയ	അമോ ഫോസ്	എം. ഒ. പി	മഗ്നീഷ്യം സൾഫേറ്റ്	സൾഫർ	ഫൊറസ് സൾഫേറ്റ്	ഇതിശ്	സിങ്ക് സൾഫേറ്റ്	മാംഗനീസ് സൾഫേറ്റ്	ബോറാക്സ്
ഒന്നാം ഗഡു	20000	54	-	25	31	32	-	6	-	-	-	4
രണ്ടാം ഗഡു	-	82	51	-	0	-	-	-	-	-	-	-
മൂന്നാം ഗഡു	-	-	51	-	0	-	-	-	-	-	-	-

വിള II.പടവലം (ഗ്രാം/ചെടി)

	ജൈവവളം കി.ഗ്രാം	കമ്മായം ഗ്രാം/ചെടി	യൂറിയ	അമോ ഫോസ്	എം. ഒ. പി	മഗ്നീഷ്യം സൾഫേറ്റ്	സൾഫർ	ഫൊറസ് സൾഫേറ്റ്	ഇതിശ്	സിങ്ക് സൾഫേറ്റ്	മാംഗനീസ് സൾഫേറ്റ്	ബോറാക്സ്
ഒന്നാം ഗഡു	10	54	-	12	16	32	-	6	-	-	-	4
രണ്ടാം ഗഡു	-	82	39	-	0	-	-	-	-	-	-	-
മൂന്നാം ഗഡു	-	-	39	-	0	-	-	-	-	-	-	-

വിള III.തക്കാളി (ഗ്രാം/ചെടി)

	ജൈവവളം കി.ഗ്രാം	കമ്മായം ഗ്രാം/ചെടി	യൂറിയ	അമോ ഫോസ്	എം. ഒ. പി	മഗ്നീഷ്യം സൾഫേറ്റ്	സൾഫർ	ഫൊറസ് സൾഫേറ്റ്	ഇതിശ്	സിങ്ക് സൾഫേറ്റ്	മാംഗനീസ് സൾഫേറ്റ്	ബോറാക്സ്
ഒന്നാം ഗഡു	1	5	-	2	1	3	-	1	-	-	-	0
രണ്ടാം ഗഡു	-	7	4	-	1	-	-	-	-	-	-	-
മൂന്നാം ഗഡു	-	-	4	-	0	-	-	-	-	-	-	-

ലഭ്യത അനുസരിച്ച് വളങ്ങൾ മാറ്റി ഉപയോഗിക്കേണ്ടി വരികയാണെങ്കിൽ അടുത്തുള്ള കൃഷി ഓഫീസറുമായി ബന്ധപ്പെടുക.

NB : മണ്ണ് പരിശോധന അടിസ്ഥാനത്തിൽ മാത്രമേ സൂക്ഷ്മ മൂലകങ്ങൾ (കോപ്പർ,സിങ്ക്,ബോറോൺ) അടങ്ങിയ വളങ്ങൾ മണ്ണിൽ ചേർക്കാവൂ.

മണ്ണ് പരിശോധനയുടെഫലം

നമ്പർ	പരിശോധന ഘടകം	ഫലം	നിലവാരം	നമ്പർ	പരിശോധന ഘടകം	ഫലം	നിലവാരം
1	പി എച്ച് മൂല്യം	5.4	അധികം അമ്ലത	8	ലഭ്യമായ സൾഫർ - mg/kg	13.8	പര്യാപ്തം
2	ലവണ മൂല്യം -dS/m	0.02	ക്രമം	9	സിങ്ക്-HCl - mg/kg	> 5	പര്യാപ്തം
3	ജൈവ കാർബൺ - %	.2	കുറവ്	10	മാംഗനീസ്-HCl - mg/kg	9.2	പര്യാപ്തം
4	ലഭ്യമായ ഭാവഹം -kg/ha	93	കൂടുതൽ	11	ഇരുമ്പ്-HCl - mg/kg	3.8	അപര്യാപ്തം
5	ലഭ്യമായ ക്ഷാരം -kg/ha	138	മധ്യമം	12	ചെമ്പ്-HCl - mg/kg	1.93	പര്യാപ്തം
6	ലഭ്യമായ കാൽസ്യം -mg/kg	226.2	അപര്യാപ്തം	13	ബോറോൺ -mg/kg	0.13	അപര്യാപ്തം
7	ലഭ്യമായ മഗ്നീഷ്യം -mg/kg	49.6	അപര്യാപ്തം		DFC		230/093

Soil Analysis Done at : **Krishi Vignan Kendra, Kottayam -2014-10-09**

കൂടുതൽ വിവരങ്ങൾക്ക് **www.keralasoilfertility.net** എന്ന വെബ്സൈറ്റ് സന്ദർശിക്കുക.
താങ്കളുടെ കൃഷിഭൂമിയുടെ ആരോഗ്യ സൂചികയും പരിപോഷണ നിർദേശങ്ങളും ലഭിക്കുന്നതിന് സാമ്പിൾകോഡ് ഉപയോഗിക്കുക

- Rock phosphates can be used advantageously in rice, grown in acid soils during the virippu season. Powdered rock phosphate may be applied and mixed thoroughly with soil by ploughing. After two or three weeks, the field may be flooded, worked up and planted with rice. Under this situation, phosphorus in rock phosphate gets converted to iron phosphate, which on subsequent waterlogging becomes available to the rice crop.
- Rock phosphate can be used successfully as a phosphatic source for leguminous crop since its root system can extract phosphorous from rock phosphate.
- In case of rice-legume cropping sequence in acid soils, application of rock phosphate to the pulse crop helps to skip phosphatic fertilizers in the succeeding rice crop.
- Since phosphorus requirement of seasonal crops is confined to the early stages, phosphatic fertilizers are to be applied at the time of seeding or planting. Top dressing of phosphatic fertilizer leads to wastage of the fertilizer nutrient. Further, excessive phosphates may lead to deficiency of micronutrients such as zinc, boron etc.

Management of potassium fertilizers

- Potassium fertilizers should be applied in as many splits as possible, to reduce loss of potassium.
- In acid soils, potassium fertilizers should be applied only after lime application to prevent loss of potassium by leaching.

A multi-institutional project of Kerala State Department of Agriculture involving DST laboratories, CSPHC, ICAR Institutes (NBSS&LUP, Bengaluru, CTCRI, Thiruvananthapuram, CPCRI, Kayamkulam, IISR, Kozhikode), Kerala Agricultural University (COA-V,COA-P,OARS-K,RRS-V, RRS-M, RARS-K, RTL, RARS-P, KVK-W,PRS-P), KFRI-Peechi, ICRI (Spices Board), IIITM-Kerala and CESS-Thiruvananthapuram and Co-ordinated by Kerala State Planning Board.

Soil Nutrient Management Information System
Developed by IIITM-K
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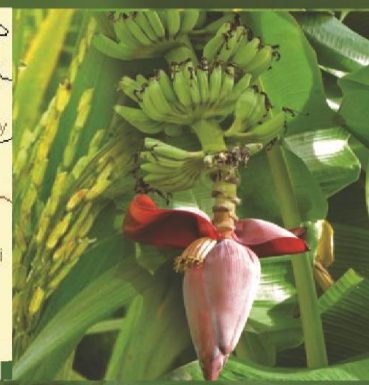
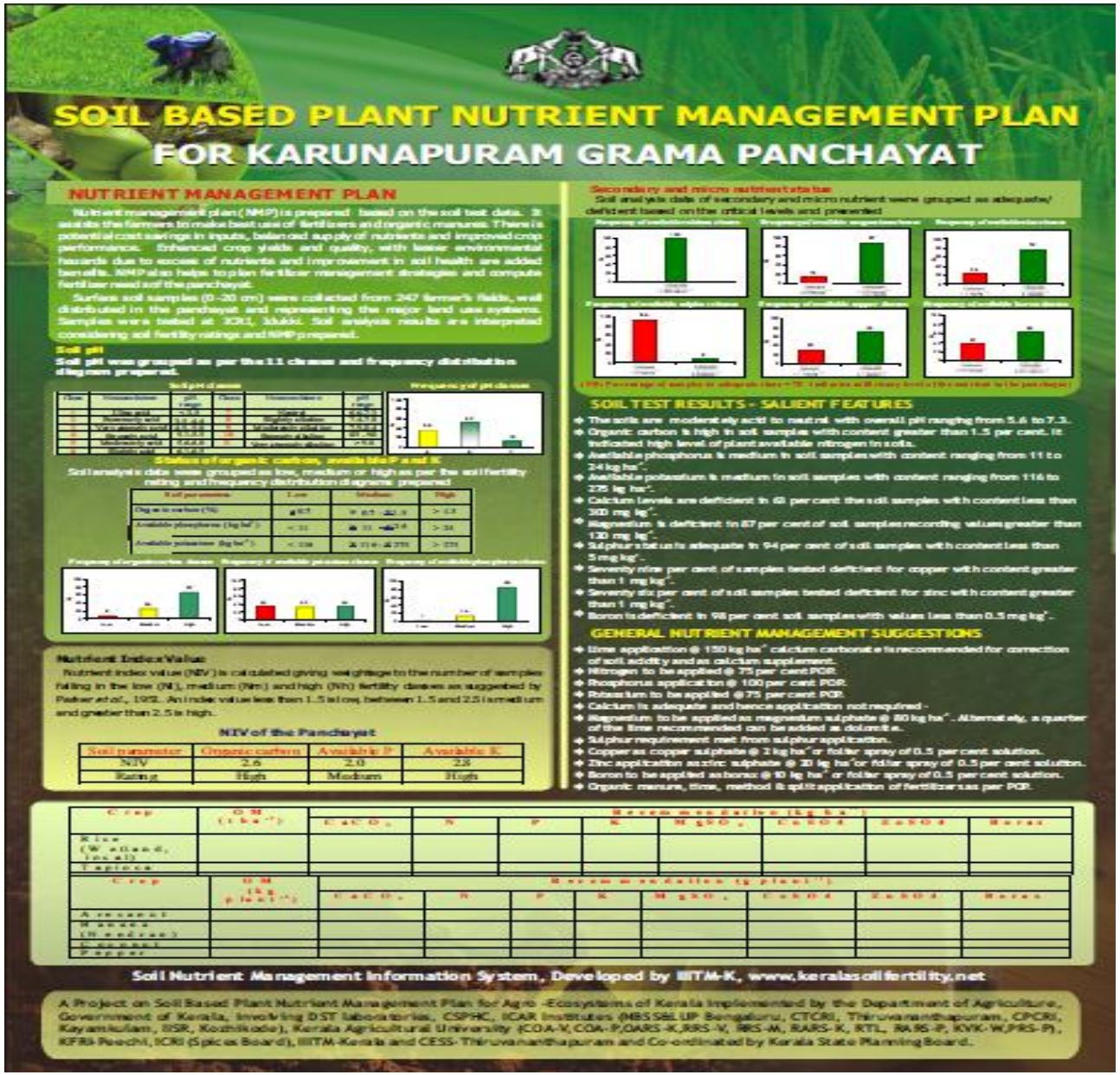
SOIL BASED PLANT NUTRIENT MANAGEMENT PLAN FOR POZHUTHANA GRAMA PANCHAYAT

Block - Kalpetta *District- Wayanad*



PROJECT ON
SOIL BASED PLANT NUTRIENT MANAGEMENT PLAN
FOR AGRO -ECOSYSTEMS OF KERALA

DEPARTMENT OF AGRICULTURE
GOVERNMENT OF KERALA
2014

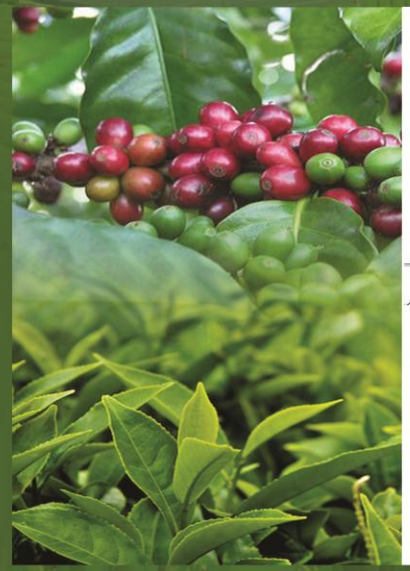

SOIL BASED PLANT NUTRIENT MANAGEMENT PLAN
FOR KARUNAPURAM GRAMA PANCHAYAT
NUTRIENT MANAGEMENT PLAN
Soil pH
Soil pH was grouped as per the 11 classes and frequency distribution diagram prepared.
Contents of organic carbon, available P and K
Soil analysis data were grouped as low, medium or high as per the soil fertility rating and frequency distribution diagrams prepared
Nutrient Index Value
Nutrient index value (NIV) is calculated giving weightage to the number of samples falling in the low (Nl), medium (Nm) and high (Nh) fertility classes as suggested by Parker et al., 1951. An index value less than 1.5 is low, between 1.5 and 2.5 is medium and greater than 2.5 is high.
NIV of the Panchayat
Soil parameter | Organic carbon | Available P | Available K
NIV | 2.6 | 2.0 | 2.8
Rating | High | Medium | High
Secondary and micro nutrient status
Soil analysis data of secondary and micro nutrient were grouped as adequate/ deficient based on the critical levels and presented
SOIL TEST RESULTS - SALIENT FEATURES
The soils are moderately acid to neutral with overall pH ranging from 5.6 to 7.3.
Organic carbon is high in soil samples with content greater than 1.5 per cent. It indicated high level of plant available nitrogen in soils.
Available phosphorus is medium in soil samples with content ranging from 11 to 24 kg ha-1.
Available potassium is medium in soil samples with content ranging from 116 to 235 kg ha-1.
Calcium Levels are deficient in 68 per cent the soil samples with content less than 300 mg kg-1.
Magnesium is deficient in 87 per cent of soil samples recording values greater than 120 mg kg-1.
Sulphur status is adequate in 94 per cent of soil samples with content less than 5 mg kg-1.
Seventy nine per cent of samples tested deficient for copper with content greater than 1 mg kg-1.
Seventy six per cent of soil samples tested deficient for zinc with content greater than 1 mg kg-1.
Boron is deficient in 98 per cent soil samples with values less than 0.5 mg kg-1.
GENERAL NUTRIENT MANAGEMENT SUGGESTIONS
Lime application @ 150 kg ha-1 calcium carbonate is recommended for correction of soil acidity and as calcium supplement.
Nitrogen to be applied @ 75 per cent POR.
Phosphorus application @ 100 per cent POR.
Potassium to be applied @ 75 per cent POR.
Calcium is adequate and hence application not required -
Magnesium to be applied as magnesium sulphate @ 80 kg ha-1. Alternately, a quarter of the lime recommended can be added as dolomite.
Sulphur requirement met from sulphur application.
Copper as copper sulphate @ 2 kg ha-1 or foliar spray of 0.5 per cent solution.
Zinc application as zinc sulphate @ 30 kg ha-1 or foliar spray of 0.5 per cent solution.
Boron to be applied as borax @ 10 kg ha-1 or foliar spray of 0.5 per cent solution.
Organic manure, time, method & split application of fertilizers as per POP.
Crop | OM (t ha-1) | Recommendation (kg ha-1): CaCO3 | N | P | K | MgSO4 | ZnSO4 | Borax
Rice (Wetland, Local)
Tapioca
Crop | OM (kg plant-1) | Recommendation (g plant-1): CaCO3 | N | P | K | MgSO4 | ZnSO4 | Borax
Arecanut
Banana (Nendran)
Coconut
Pepper
Soil Nutrient Management Information System, Developed by IIITM-K, www.keralasoilfertility.net
A Project on Soil Based Plant Nutrient Management Plan for Agro -Ecosystems of Kerala Implemented by the Department of Agriculture, Government of Kerala, involving DST laboratories, CSPHC, ICAR Institutes (NBSSLUP Bengaluru, CTCRI, Thiruvananthapuram, CPCRI, Kayamkulam, IISR, Kozhikode), Kerala Agricultural University (COA-V, COA-P,OARS-K,RRS-V, RRS-M, RARS-K, RTL, RARS-P, KVK-W,PRS-P), KFRI-Peechi, ICRI (Spices Board), IIITM-Kerala and CESS-Thiruvananthapuram and Co-ordinated by Kerala State Planning Board.

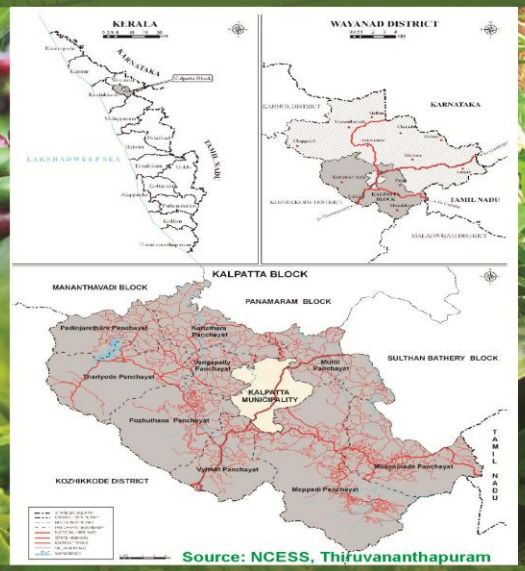
Block NMP

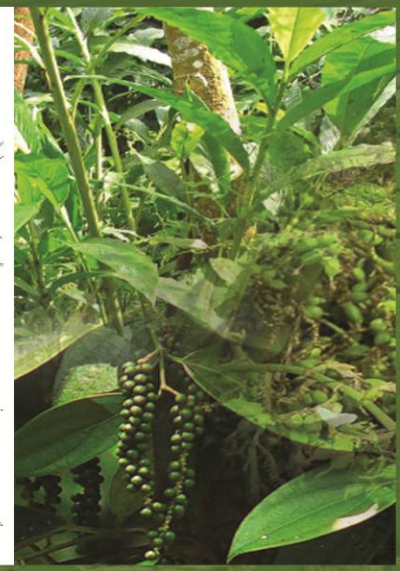
BNP No: 132

SOIL BASED PLANT NUTRIENT MANAGEMENT PLAN FOR KALPETTA BLOCK PANCHAYAT

District - Wayanad







A multi-institutional project of Kerala State Department of Agriculture involving DST laboratories, CSPHC, ICAR Institutes (NBSS&LUP, Bengaluru, CTCRI, Thiruvananthapuram, CPCRI, Kayamkulam, IISR, Kozhikode), Kerala Agricultural University (COA-V, COA-P,OARS-K,RRS-V, RRS-M, RARS-K, RTL, RARS-P, KVK-W,PRS-P), KFRI-Peechi, ICRI (Spices Board), IIITM-Kerala and CESS-Thiruvananthapuram and Co-ordinated by Kerala State Planning Board.

Soil Nutrient Management Information System
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DEPARTMENT OF AGRICULTURE
GOVERNMENT OF KERALA
2015

District NMP

A multi-institutional project of Kerala State Department of Agriculture involving DST laboratories, CSPHC, ICAR Institutes (NBSS&LUP, Bengaluru, CTCRI, Thiruvananthapuram, CPCRI, Kayamkulam, IISR, Kozhikode), Kerala Agricultural University (COA-V, COA-P,OARS-K,RRS-V, RRS-M, RARS-K, RTL, RARS-P, KVK-W,PRS-P), KFRI-Peechi, ICRI (Spices Board), IIITM-Kerala and CESS-Thiruvananthapuram and Co-ordinated by Kerala State Planning Board.

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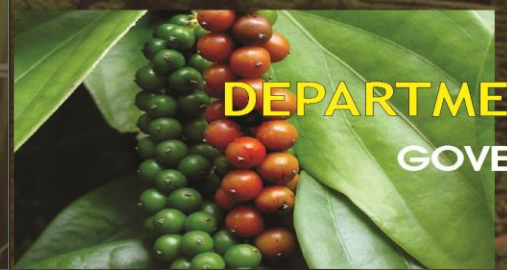
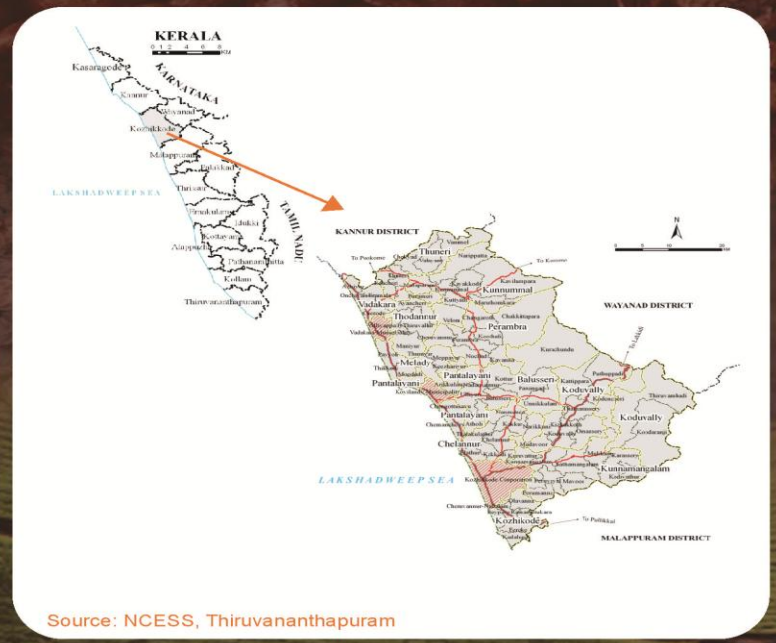


DNP Series: 11

SOIL BASED PLANT NUTRIENT MANAGEMENT PLAN FOR KOZHIKODE DISTRICT



Source: NCESS, Thiruvananthapuram

DEPARTMENT OF AGRICULTURE

GOVERNMENT OF KERALA

2015


Thank You