Digital troubleshooting – an efficient handy tool to increase coconut productivity

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We all know that 'proper diagnosis is half way to cure'. The Integrated Nutrient Management (INM), Integrated Pest Management (IPM) and Integrated Disease Management (IDM) measures are being recommended to the students and trainees, as part of the package of practices to be adopted for a particular crop. The set pattern is name of the crop, botanical name and classification, planting material, seed rate, land preparation, planting systems, manuring and nutrition, pests, diseases, others, yield, storage and post harvest processing, etc.

As of 2014-15, in India, coconut is cultivated in 1.976 million ha with a production of 20439.60 million nuts. Incidence of pest and diseases and ill maintained gardens are the major weaknesses in coconut sector in India. It may be noted that severe and ill/unmanaged incidence of some pests (like red palm weevil) and diseases (bud rot) are lethal to the palm.

As per the APCC Statistical Year Book 2013, India ranks first in production with 22680.03 million nuts followed by Indonesia (16463.00 m nuts) and Phillipines (15353.00 m nuts). India holds second position in productivity with 10615 nuts/ ha. next to Brazil (11923 nuts/ ha).

Though India ranks first in production, the nuts are small and the out turn of product components like kernel, shell, etc. from coconut is also low, compared to the nuts in other countries. For example, when 6800 nuts are required for making one ton of copra, 4500-5000 nuts are required in other countries. Likewise the figures are 30000 whole shells vis a vis 20000-25000 whole shells for production of one ton charcoal. When 1000 Indian coconuts could fetch 250 kg coconut milk, the Thai and Samoan coconuts yield about 320 kg milk. About 85 % of the coconut area is occupied by WCT and ECT. Superior exotic/ indigenous varieties/ hybrids are not cultivated in large scale.

Several steps are being taken up to increase the production levels by concentrating on bringing out improved varieties, increasing the area under cultivation

with high yielding varieties, creating awareness on adopting INM, IPM and IDM practices, etc. The proportion of losses in yield due to pests/ diseases/ nutritional deficiencies is more which may be evident from the gap between the yield expected by the research institutes and the actual yield obtained by the farmers. 24% of yield gap in coconut was observed between demonstration plot and actual farmers plot yield in Karnataka.

Majority of the farmers do not practice regular manuring and pest & disease management measures. Even if they adopt, they follow the blanket recommendations irrespective of the soil physical and chemical properties/ plant nutrient levels in case of fertilizers and the causal organism and intensity in case of pesticides and fungicides.

It may be observed that in many print/ web publications about the pests and diseases of each crop, the set pattern of name of the disease-causal organism-severity-symptoms-management measures is followed. The symptoms like yellowing of leaves, necrosis in leaves/ inflorescences, reduction in size of leaves/ inflorescence/ seed/fruit/nut, etc. for many diseases, nutritional disorders, other abiotic stresses are apparently more similar. The proper diagnosis of the abnormality observed in the plant part can be done only on detailed study of the characteristic symptoms with reference to the pest/ disease/ nutrient disorder/ other abiotic stresses.

Hence, there is a need to facilitate the farmers and other stakeholders to diagnose the abnormality observed by them in their plants by a 'Symptomatic approach' rather than the 'academic approach'. For example, yellowing of leaves in coconut may be a symptom of wilting, nutritional (one or many elements) deficiency or a symptom of prolonged water accumulation in the basin. The deficiency of one nutrient may be observed with the yellowing of leaflets initially from margins and proceeds to the midrib and for the other nutrient may be from midrib to margins. For some it may be in older leaves, for some in younger leaves and for some in all the leaves.

In this digital era, with many internet facilities, the farmer oriented websites should have developed a user friendly 'Diagnose your palm' with interactive trouble shoot module in html.

As per a press release of TRAI, 1017.97 million wireless telephone subscribers and 140.10 million broadband subscribers are there in India, as on 31.01.2016. The Hindu, a leading daily, reported in February 2016 that active unique smart phone users in India crossed 220 million, according to a report by Counterpoint Research. According to a survey by Kissan Sanchar, a joint venture of IFFCO, Bharti Airtel and Star Global Resources Ltd, 9 % of the Indian farmers have smart phones. By now this would have grown to manifolds. Farmers are using features such as SMS, Voice Messaging, Helpline, Whatsapp, Facebook and group meetings to get information about weather and rain forecast, wind speed alert, weather, agronomy, insect pest management, market rates, career counseling for young members of farming families, agribusiness opportunities and networking among the farmers.

Suitable apps may also be developed for each crop so that the farmer can operate the apps in the plantation itself, on every 'Next' in the trouble shoot mode till he reaches the appropriate diagnosis. Once the diagnosis is conclusive the next click can lead him to the curriculum approach of the etiology, management measures, steps for avoiding in future, etc.

Educating the farmers with proper diagnosing techniques instantly at the time of noticing the abnormality will certainly encourage them to take necessary corrective measures. This will increase the productivity of the crop. The higher production achieved though this effective management will cater additional inputs to the coconut processing sector, which are booming in the past few years through the Three Tier Farmers' Collectives viz., CPSs, CPFs and CPCs being set up on the best interventions of the Coconut Development Board.

Necessary provisions in the trouble shoot module should be given so that the region of plantation can be fed into the module for accessing location specific information. Once the disease or disorder is properly diagnosed, the link with all the authentic sources of recommended management measures are to be listed based on the priority ranking, but the option should be left with the user.

It means that if a coconut farmer from Assam diagnoses a disease though his smart phone, there may be fields for entering the State & District of the location of the coconut garden. If these fields are filled, the links for 'recommended management practices' should be prioritized in the order of the nearest research/ educational/ government agencies, which may be more location specific. In this case, the link of the CPCRI, Kahikuchi, SAU, State Agri/ Horti Department, CPCRI, Mohit nagar, SAU, WB, WB Agri/ hort Dept. & so on.

A corresponding clear high quality picture beside each and every option in the trouble shoot windows should preferably be placed to facilitate nearing accuracy in diagnosis.

Adequate definitions should be provided, preferably right below, for the botanical terms as many people may not know them. For example, many people may not be familiar with spadix (the botanical term of the coconut inflorescence), fronds (leaves), leaflets, trunk, peduncle, necrosis, etc.

Few sample windows of the html/ android app are given below to take a lead.

Location of the coconut garden	
State*	District*

Total No. of coconut palms		
Variety	No. of palms	Source of planting material
Total		


Leaf/ frond


Fruit/ Nut

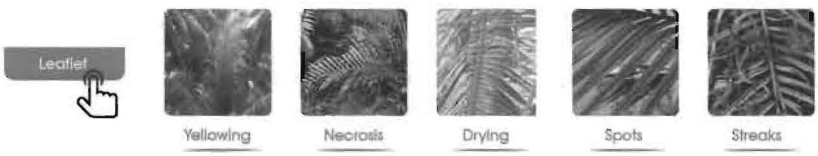

Leaflet


Trunk

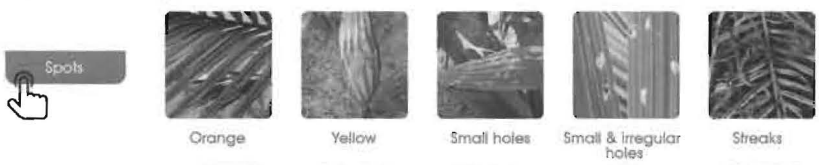

Inflorescence


Root

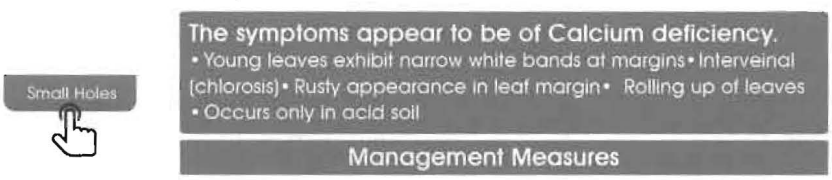
For example, if '**Leaflet**' is clicked



If '**Spots**' is clicked,

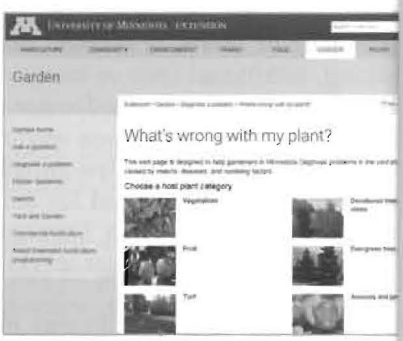


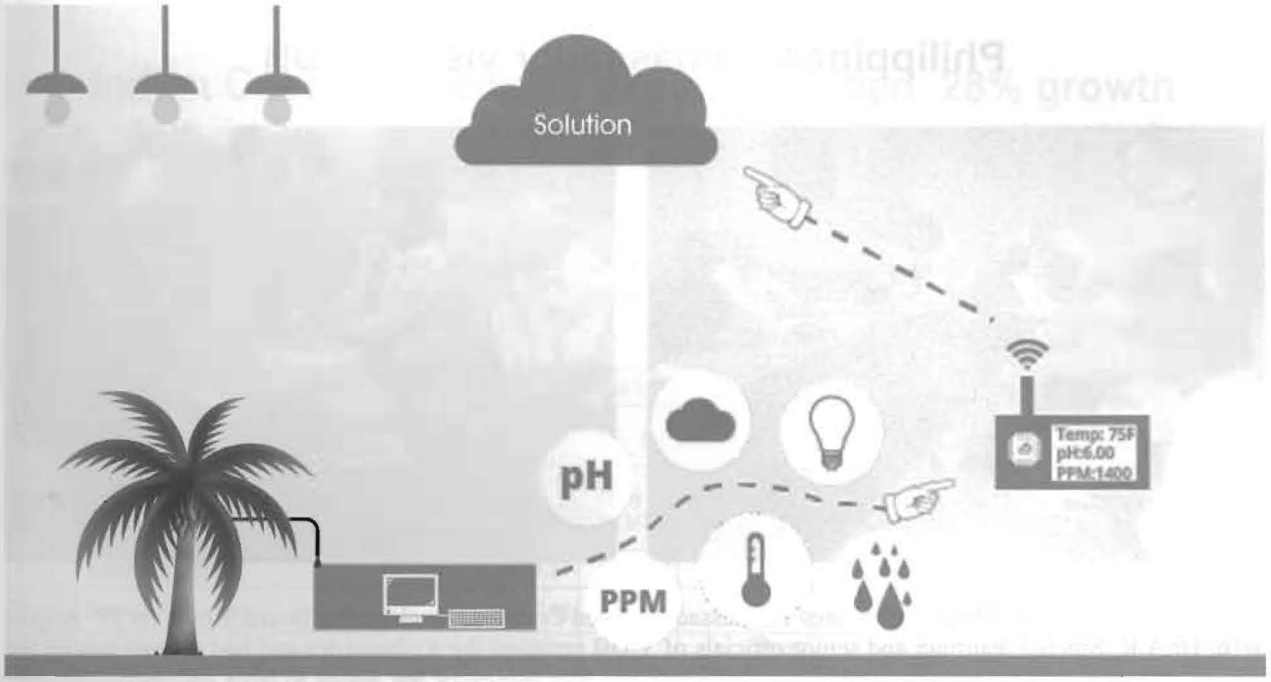
If '**Small Holes**' is clicked,



If '**Management Measures**' is clicked,

Institute	Recommendation	Weblink
CPCRI		
Tamil Nadu agricultural University	Soil application of lime based on lime requirement and root feeding of 1% calcium nitrate	http://agritech.tnau.ac.in/horticulture/horti_pcrops_coconut_phy_dis_minor.html
BCKV, West Bengal		
Kerala Agricultural University		
Dept. of Agriculture, Govt. of Karnataka		
Dept. of Agriculture, Govt. of Tripura		
CPCRI, RS, Kahikuchi, Assam		





While describing the symptoms and the management measures in this trouble shoot module utmost care should be taken. Any minor error may lead to improper diagnosis of the problem and consequently a wrong management measure which would be a waste of time, energy, money and damage (even lethal to) the palm.

If the user is not conclusive about the diagnosis with this module, an 'online help' link may be provided which can be replied by experts after getting indicative information from the user.

Currently the farmers can get adequate information related to package of practices including INM, IPM & IDM, availability of planting materials, marketing prospects, etc. through Kisan Call Centres across the country by toll free no. 1551, direct phone call to the live programmes in the recently unveiled 'DD Kisan' television channel and in other agriculture related programmes telecasted by many government/ private channels through direct telephonic interaction. Though it is very helpful to the farmers, many farmers could not express the symptoms and problems they observed in the field mainly due to linguistic dialects and regional differences in terminologies which often hinders the expert to guide the caller (farmer) properly.

This hurdle can be better overcome by this module. Frequent updation of the apps is a must so that the accuracy level in diagnosis and management measures are improved.

Once the farmer habituates to this user friendly module, he may make regular observations as per the menu and take appropriate remedial measures in time. This will also facilitate the farmers in explaining the problems to experts and the experts clearly understand the problems and suggest appropriate corrective measures. Such diagnostic tools are available in few websites like NC State University (Blackberry Diagnostic Tool), University of Minnesota (What's Wrong With My Plant?), Sorghum,

At the first instance, this would be of immense help to the coconut farmer members of the 9272 odd Coconut Producers' Societies who are conglomerated to more than 716 Coconut Producer Federations and 65 Coconut Producer Companies in the States of Kerala, Tamilnadu, Karnataka, Andhra Pradesh, Odisha, West Bengal, Maharashtra and about 52,000 Friends of Coconut Trees in 11 States and 2 Union Territories. Further, it may be of much beneficial to the technical staff of the central, State Departments, Universities, KVKs and other stakeholders. The coconut farmer can make the maximum benefit on his own from the module at his palm top (smart phone/ tablet PC) and can count more nuts in the 'palm top' (yield).

References:

Shivalingaiah, Y. N.; Reddy, K. M. S.; Nagappa Desai, 2012, Yield gap, adoption pattern analysis and production constraints of coconut growers in Karnataka, Mysore J. of Agric. Sciences, 2012, Vol. 46 No. 4 pp. 880-885, Telecom Regulatory Authority of India, New Delhi Press release no. 22/2016 dt. 23.03.2016, Vasanthakumar VC, 2016, Tamil Nadu leads in coconut productivity – CDB survey Report, Indian Coconut Journal, 2016 Vol. LVIII No. 10, pp. 18-25