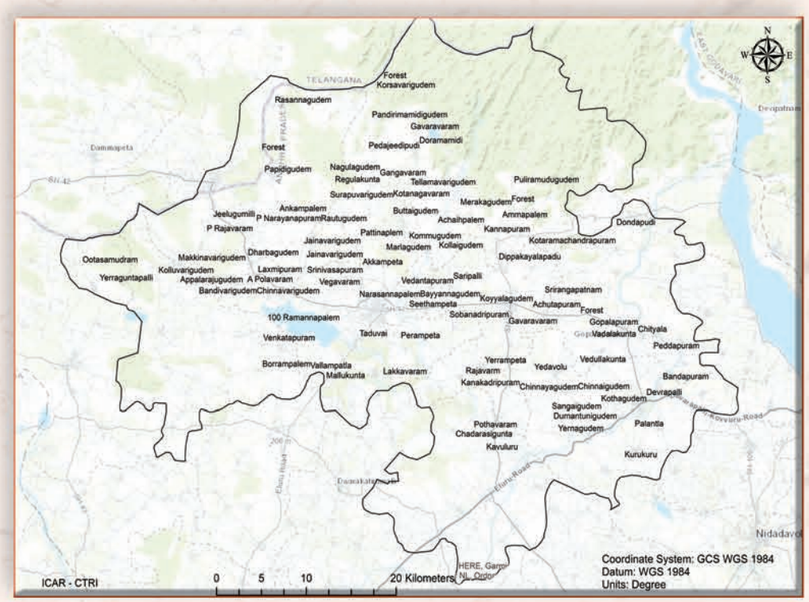
Fertility Status of FCV Tobacco Growing Soils in NLS Region

Assessment and Mapping

NORTHERN LIGHT SOILS REGION UNDER FCV TOBACCO



RECOMMENDATIONS

- The NLS soils need practicing green manuring before FCV tobacco crop to improve organic carbon build-up to enhance N availability and soil physical conditions
- Addition of phosphorus fertiliser is to be regulated by reducing or skipping the dose or to give only a maintenance dose to avoid accumulation of phosphorus and to minimise the possible adverse effects on micronutrients in the soil and check P transfer to surface water bodies (eutrophication)
- Soils low or deficient in zinc under NLS require addition of recommended zinc fertiliser *i.e.*, Zn So_4 @ 50 kg ha^{-1} to get better tobacco yield and quality

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Project
Assessment of Soil Fertility and Development of Online Fertiliser Recommendation System for FCV tobacco growing soils of India
(Sponsored by: Tobacco Board, Guntur)

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RATIONALE

Nutrient status in soils are depleting due to continuous mining of nutrients without replenishment and affecting sustainable productivity of a soil. Assessment of soil fertility including micronutrients in areas growing commercial crops is essential to manage the nutrient availability and enhance production levels. Efficient use and management of nitrogen and potassium is essential in FCV tobacco as they play a key role in improving the yield and quality. Micronutrients Zn and Cu are very important for getting high yield and maximum percentage of bright grades. Hence, it is important to know the variation of soil properties in a spatial scale of an area or a region which help in identifying hot spots and specific zones of interest. Spatial thematic mapping of soils using GIS as a tool is the better way to observe the variation which support in developing strategies for managing inputs, soil and crop interventions to improve production and productivity.

NORTHERN LIGHT SOILS OF FCV TOBACCO

FCV tobacco is grown in Northern Light Soils of Andhra Pradesh in an area of 21 thousand hectares during *Rabi* under irrigated condition. Major physiographic units are alluvial plains and uplands. It is a conglomerate of red sandy loams to sandy clay loams in uplands and clay loams to clay in deltaic alluvial plains under the USDA soil taxonomic classes *viz. Rhodustalf, Ustochrept and Haplusterts* formed from red sandstones, crystalline metamorphic rocks and Alluviums. The major crops grown in the area besides irrigated FCV tobacco are oil palm, maize, sugarcane, cotton, chillies, groundnut and paddy. Predominent orchard crops are mango, cashew and coconut. *Aliveru, Jalleru, Yerrakaluva and Polavaram* left canal are the major irrigation source besides ground water bores and local ponds.



FCV tobacco crop in Northern Light Soil region of Andhra Pradesh

To assess the soil fertility and develop thematic maps of the area field level soil samples and geo reference points were collected from FCV tobacco representative villages (116) under five auction platforms of Tobacco Board. The area is bounded between the longitudes/latitudes of *81°22'027.084" E/17°24'06.236" N & 81°22'35.488"E/16°51'46.597"N* from North to South and *81°01'50.148" E/17°04'32.169" N & 81°39'21.159" E/ 17°10'40.772"N* from West to East of West Godavari district of Andhra Pradesh. Captured ground truth of soil samples with GPS used for GIS work and soils were analysed for soil fertility parameter using standard analytical method.



Soil sample and Geo reference collection in Northern Light Soil region of Andhra Pradesh

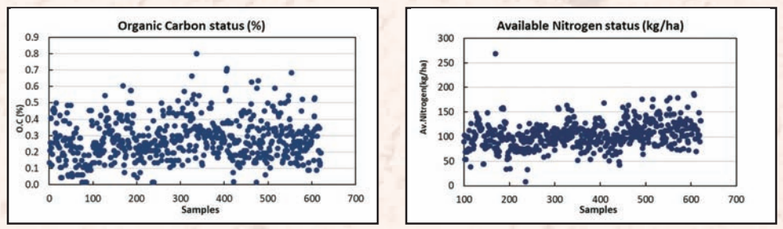
SOIL FERTILITY STATUS

Physico - chemical properties

Northern Light Soils are mostly moderately acidic with a mean value of soil pH 6.43. The electrical conductivity (EC) values showed that the soils are well within the salt free limits with a mean value of 0.07dSm^{-1}. Soil chlorides ranged between 8 - 124 ppm with a mean value of 45 ppm.

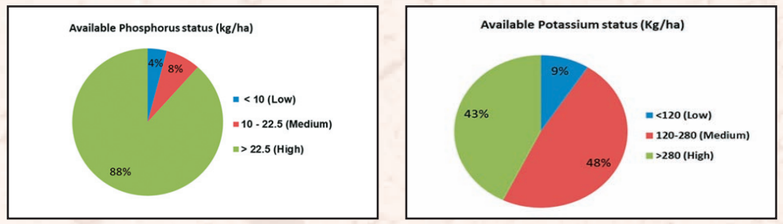
Available Macro nutrients and Organic carbon

The mean per cent organic carbon and mean available nitrogen contents of NLS were 0.27 per cent & 106.0 kg/ha, respectively. They are classified under low fertility.



Soil organic carbon and available nitrogen status in NLS region

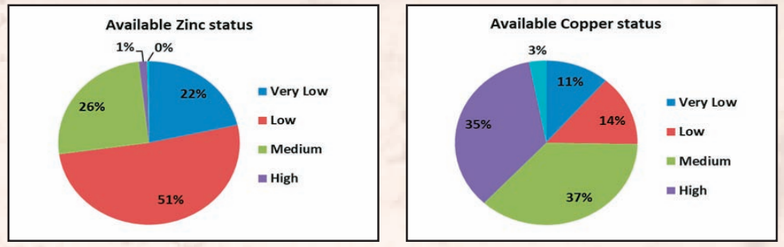
The average available phosphorus of NLS was 89.6 kg/ha and it is classified under high fertility. While, mean available potassium content was 276 kg/ha. The % distribution of available K status showed that 9 % samples are in low, 48 % samples are in medium and 43 % are in high status.



Soil available phosphorus and potassium status in NLS region

Available micronutrients

The available zinc ranged from 0.03 to 9.57 ppm. Where, 22 % samples are in very low range and 51% samples are in low range. Available copper content was very low to low class (25 % samples) i.e 0.0 - 0.30 ppm. The available iron and manganese contents are in the range of 2.13 to 94.04 ppm and 3.34 to 56.3 ppm respectively and are mostly in high to very high class. Acidic pH conditions and Fe and Mn containing parent material of the soils led to higher availability of these two micronutrients.



Soil available zinc and copper status in NLS region

Nutrient indices

Nutrient index (NI) of organic carbon & available nitrogen in NLS is 1.07and 1.00 categorized under fertility class Low. Nutrient index of available phosphorus in NLS is 2.83 and is categorized under high fertility class. Nutrient index of potassium in NLS is 2.36 and is categorized under medium fertility class. Nutrient index of zinc & copper in NLS is 1.29 (low) and 2.11 (medium), respectively. NI of available iron& available manganese is 2.93 and 2.99 respectively are categorized under high fertility class.

Soil Fertility maps

Soil fertility maps were developed using the soil fertility data and GIS software. Spatial maps depicted that available nitrogen is low except in some heavy soils under APF *Devarapalli*. Nitrogen much lower in sandy soil areas under APF *Jangareddy Gudem-I* and II compared to other areas. Spatial variation showed that the available phosphorus status was high through out the region, except very few soils under APF*Jangareddy Gudem - II* where the soils are medium in P status.

Available potassium status was medium to high in the region. It varied from medium status (120 – 280 kg ha^{-1}) in light soil areas under *Jangareddy Gudem-I, II* and *Devarapalli* to High (> 280 kg ha^{-1}) in medium to heavy textured red and alluvial black soils under APF *Koyyalagudem, Gopalapuram and Devarapalli*. Lower available zinc levels observed spatially in almost all the soils under different platforms except in few soils under *Jangareddy Gudem-I, Koyyalagudem* and *Gopalapuram*. Few heavy textured soils under APF *Devarapalli and Koyyalagudem* showed lower zinc levels compared to the other areas.

Salient features

- Northern Light Soils under FCV tobacco were low in both per cent organic carbon and available nitrogen status
- Northern Light Soils under FCV tobacco were high in available phosphorus status
- The available potassium status was medium to high in Northern Light Soil area under FCV tobacco
- Among available micronutrients, available zinc is very low to low in 73 % samples followed by available copper where 25 % samples are in very low to low status
- The soil available chlorides are below the critical limits with a mean value of 45 ppm