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**Original Article****Status and Mapping of soil Macro and Secondary nutrients in Hiriyr and Hosadurga taluks, Chitradurga district, Karnataka****<sup>1</sup>\*Chandrakala M.**<sup>1</sup>National Bureau of Soil Survey and Land Use Planning, Regional Centre, Bangalore-560024, Karnataka\*Corresponding author: [chandra.ssac@gmail.com](mailto:chandra.ssac@gmail.com)

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**ABSTRACT**

The objective of the study was to assess the soil fertility status and mapping in Hiriyr and Hosadurga taluks, Chitradurga district, Karnataka. Hence, 49 surface soil (0-20cm) samples were randomly collected from different landforms across farm lands in the taluks using GPS. Soil samples were analysed for pH, electrical conductivity (EC), organic carbon, macro-nutrients viz., available N, P, K, and secondary nutrient sulphur using standard procedures, and were mapped using kriging and interpolation in ArcGIS. Results revealed that soils were moderately acid to strongly alkaline and non-saline. Organic carbon content was low to high, available nitrogen was low, available phosphorus and potassium were low to high and available sulphur was medium to high. Knowing the status of soil macro and secondary nutrients helps farmers with site-specific fertilizer recommendation there by maintains soil nutrient balance, apart from reducing the cost of cultivation, which further helps to achieve higher income through better yield, besides maintaining soil health.

**1. INTRODUCTION**

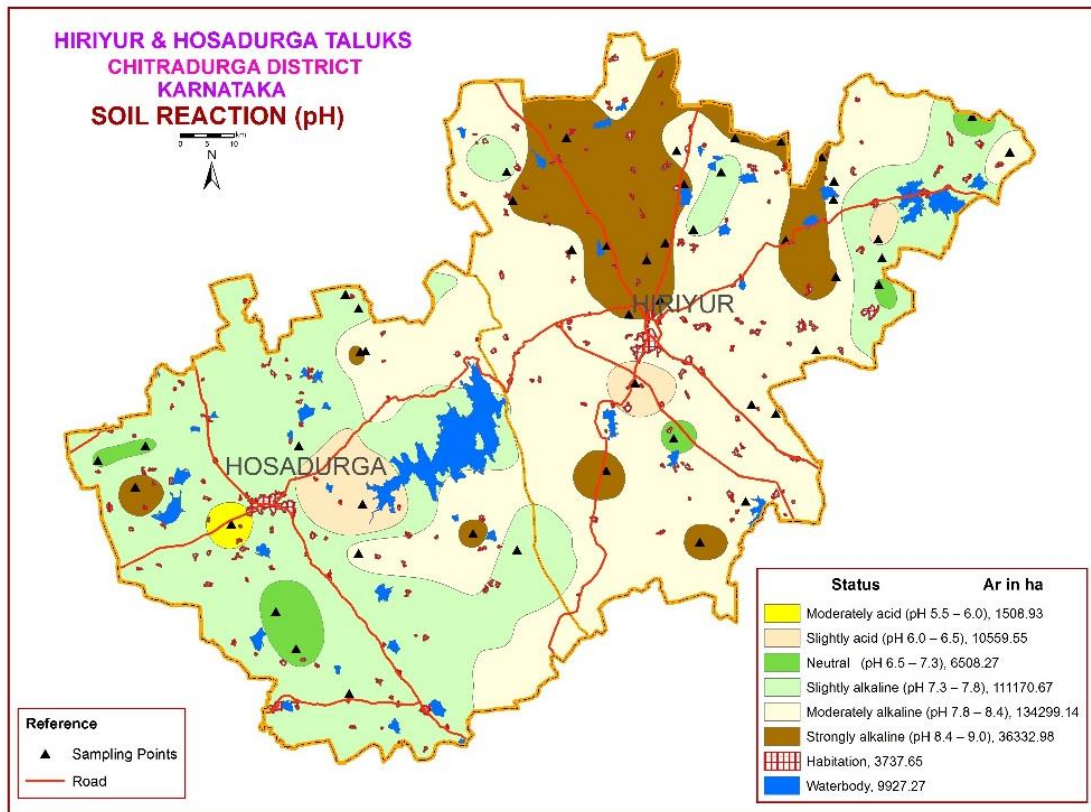
The present study has taken up in the southern part of the Chitradurga district i.e., Hiriyr and Hosadurga taluks with a total geographical area (TGA) of 1.72 lakh ha and 1.45 lakh ha, respectively lying between the north latitude of 13° 32' 20.721" to 15° 3' 27.178" N latitude to east longitude of 75° 58' 55.046" to 77° 55' 57" E with an elevation ranging from 569 m (main valley) to 760 m (Pediment) above mean sea level (amsl). Hiriyr taluk has 32 gram panchayats covering 159 villages in 4 hoblies, and Hosadurga taluk has 33 gram panchayats covering 225, mainly because of the area under irrigation. The agriculture of the taluks is mainly rainfed and some parts is irrigated through canals and bore wells. These taluks have granite gneiss and schist geology. The slope of the area is nearly level to (0-1%) and very gently sloping (1-3%), and a little area is gently sloping (3-5%) uplands. Major land use is maize, finger millet, jowar, paddy, red gram, groundnut, sunflower, banana, mango, pomegranate, sapota, onion, chilly, tomato, brinjal, coconut, areca nut, beetle vine, crosandra, jasmine, and chrysanthemum are being cultivated. Natural vegetation is Prosopis sp., Lantana, Tamarind, Acacia sp., Neem, Cactus, etc. These taluks receive scanty and

unevenly distributed rainfall from the southwestern monsoon (June-September) and the NE Monsoon (October-December). However, Hiriyyuru taluk receives 549.9 mm on 29 rainy days, and Hosadurga taluk receives 626.4 mm on 32.1 rainy days. The minimum and maximum temperatures of Hiriyyuru are 21.0 °C and 32.0 °C, respectively, whereas those of Hosadurga are 22 °C and 32.0 °C. In Hiriyyuru and Hosadurga taluks, granitic-gneisses and schists are the main groundwater-bearing formations. The highest cropping intensity is in Hiriyyuru taluk (122%). Since these taluks are mainly rainfed and have low rainfall and high temperature, it's difficult to maintain soil fertility status and also, agriculture is the main economic activity in these taluks; maintaining soil fertility status is a need of the hour. Thus, the present study was undertaken to assess the status of soil macro and secondary nutrients and mapping for site-specific fertiliser recommendation.

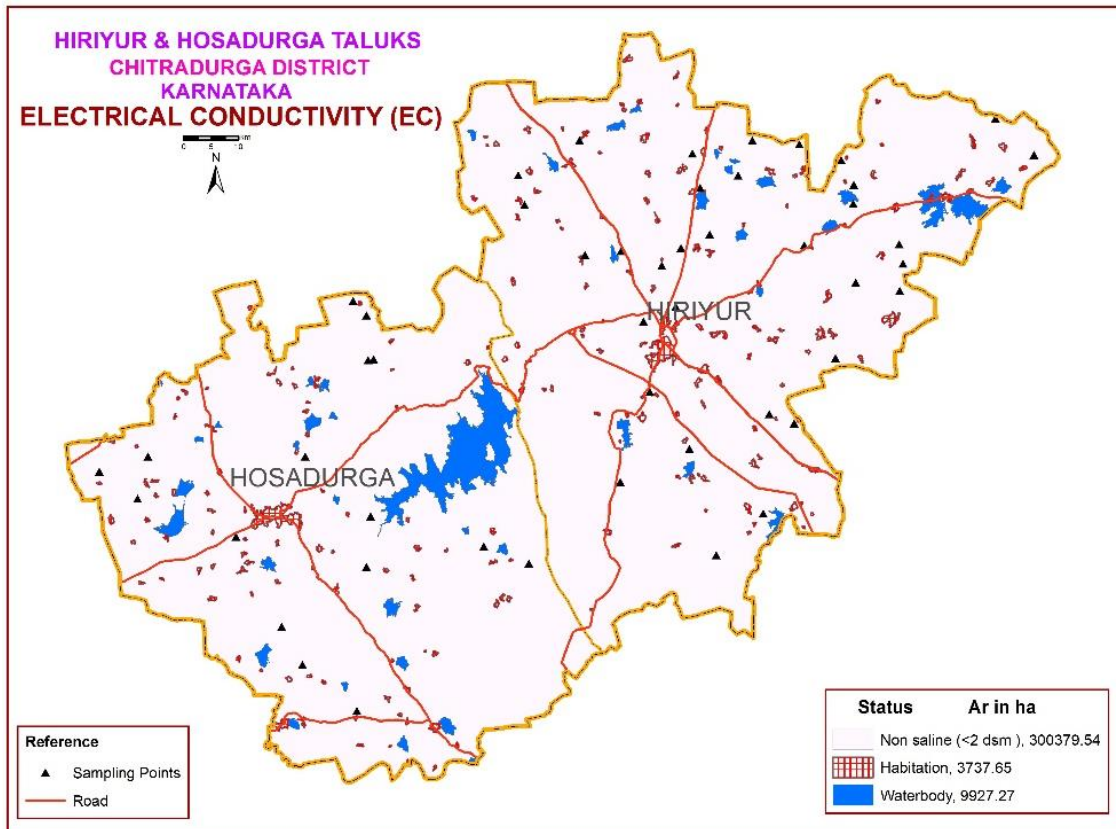
## **2. Status and mapping of soil available macro and secondary nutrients in Hiriyyuru and Hosadurga taluks, Chitradurga district, Karnataka**

### **2.1 Soil reaction (pH) and Electrical conductivity (EC)**

The soils of the Hiriyyuru and Hosadurga were moderately acid to strongly alkaline in reaction and were non-saline as EC recorded  $<2 \text{ dS m}^{-1}$  (Fig. 2). About 1,34,299 ha area was moderately alkaline, followed by slightly alkaline (1,11,170 ha) and strongly alkaline in reaction (Fig. 1). These soils need reclamation before taking up crop production. The application of acidifying agents like ammonium sulphate or elemental sulphur can progressively lower the pH over time in these soils. Around 10,559 ha area was slightly acidic, and 1508 ha area was moderately acid hence, gradual and controlled application of lime can effectively elevate the pH towards neutrality in acidic soils. The application of organic manure also helps to maintain the soil pH. High pH locks out vital micronutrients like iron. Application of chelated iron directly to the soil or as a foliar spray helps to avoid iron deficiency in crops.



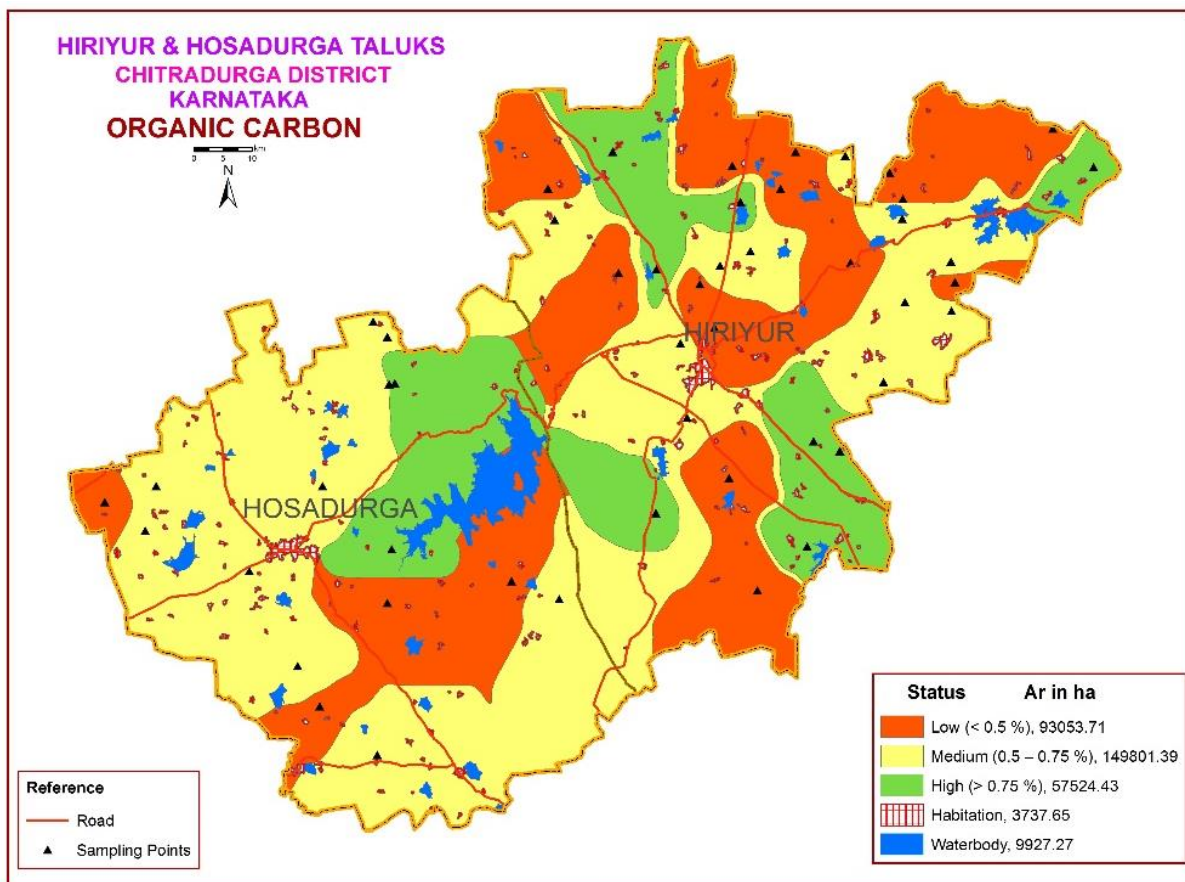
**Fig. 1:** Surface soil reaction status in HiriYur and Hosadurga taluks



**Fig. 2:** Electrical conductivity status in HiriYur and Hosadurga taluks

### 2.2. Organic carbon (OC) content

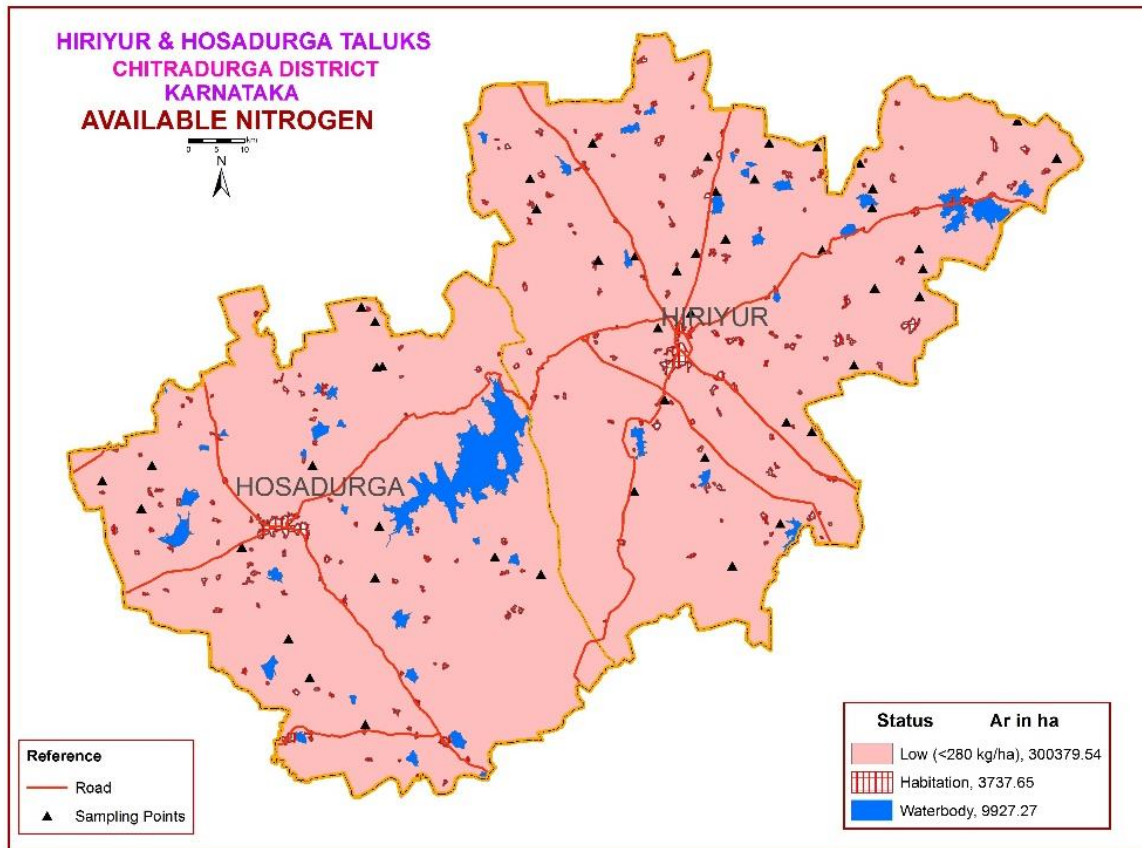
In Hiriya and Hosadurga taluks, the organic carbon content was low in 93,053 ha area, followed by 1,49,801 ha area, which was medium (Fig. 3), which needs the application of organic manures to achieve better crop growth and yield in these soils and also to combat soil degradation. Since these areas are falling under low rainfall, application of too much organic matter should be avoided; thus, constant and regular application of organic manure is a better option to improve soil fertility status and soil health. It is recommended to apply organic manures such as FYM, vermicompost, liquid organic manures such as panchagavya and jeevamruth to enrich the soil organic nutrient source (Chandrakala *et al.*, 2023).



**Fig. 3:** Organic carbon content status in Hiriya and Hosadurga taluks

### 2.3. Available Nitrogen content

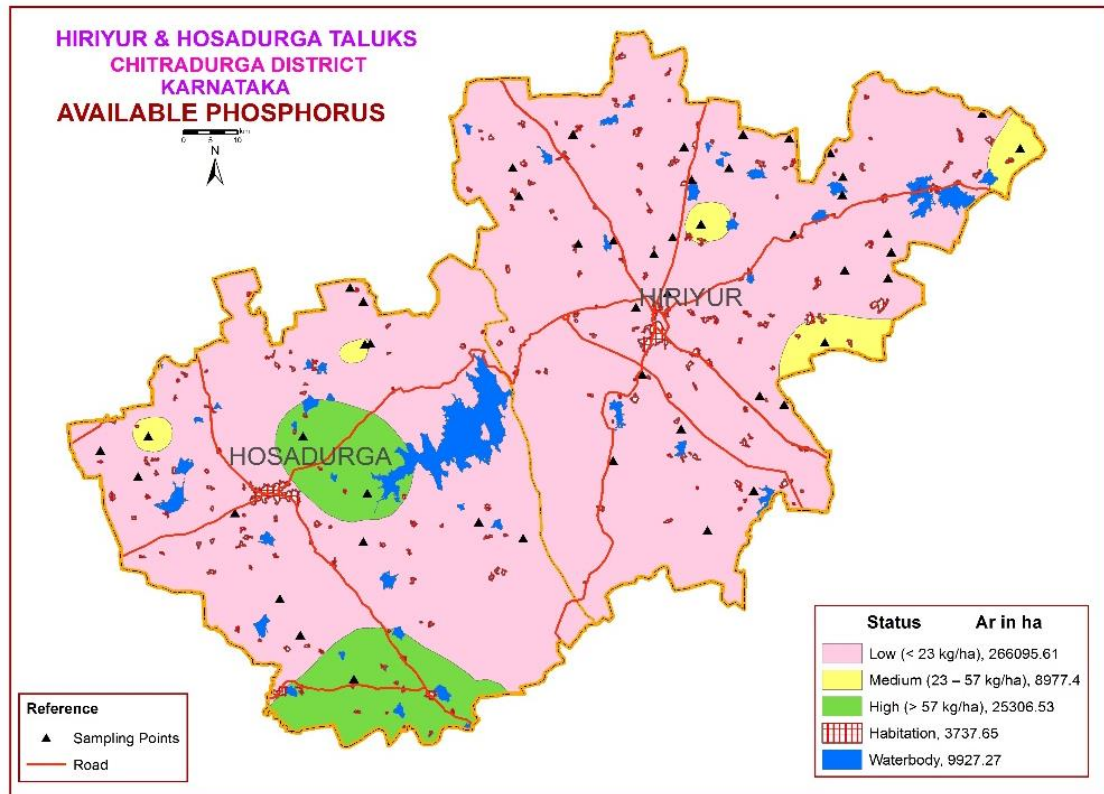
In Hiriya and Hosadurga taluks, the entire taluks are identified as low in available nitrogen content (Fig. 4); these deficiencies have to be corrected through adequate application of nitrogenous fertilisers along with organic manures. However, application of 125 per cent of the recommended dose of nitrogenous fertilisers is recommended in these soils for crop production. Avoid blanket N application, and a split application is recommended. Management practices such as incorporating slow-release or controlled-release fertilisers, deep Placement, cover crops, manure & compost, green manuring, crop rotation, bio-fertilisers, maintaining soil pH between 6.0 and 7.0, soil moisture maintenance, etc., help to manage low N fertility soils.



**Fig. 4:** Available nitrogen status in Hiriyr and Hosadurga taluks

#### 2.4 Available phosphorus (P<sub>2</sub>O<sub>5</sub>) content

Available phosphorus content in Hiriyr and Hosadurga taluks shows that around 2,66,095 ha area was low, followed by 25306 ha, which was high (Fig. 5), and 8,977 ha area was medium. In high phosphorus soils, a reduction of 25 per cent in the recommended dose of P fertiliser is recommended along with application of P-solubilising bio-fertilisers, whereas in low P fertility soils, application of 125 per cent of the recommended dose of P fertiliser is recommended for crop production.



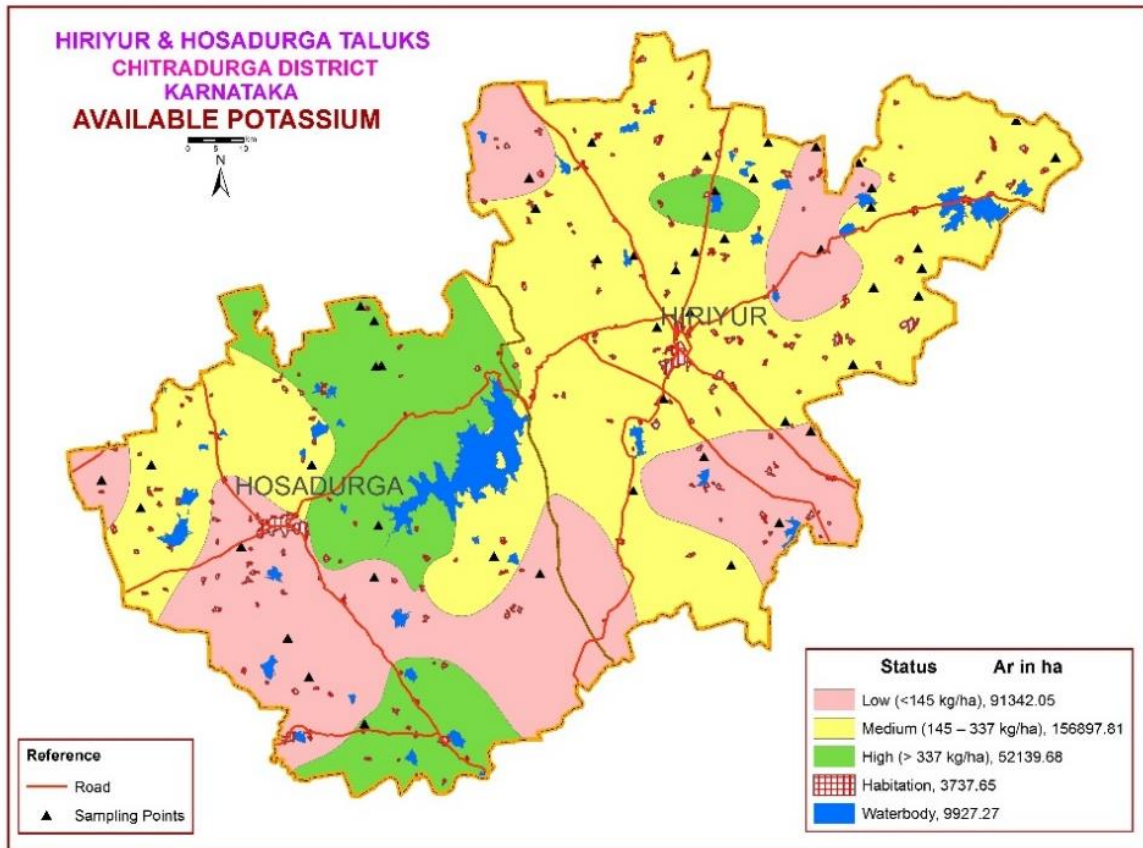
**Fig. 5:** Available phosphorus status in Hiriyr and Hosadurga taluks

**2.5. Available potassium (K<sub>2</sub>O) content**

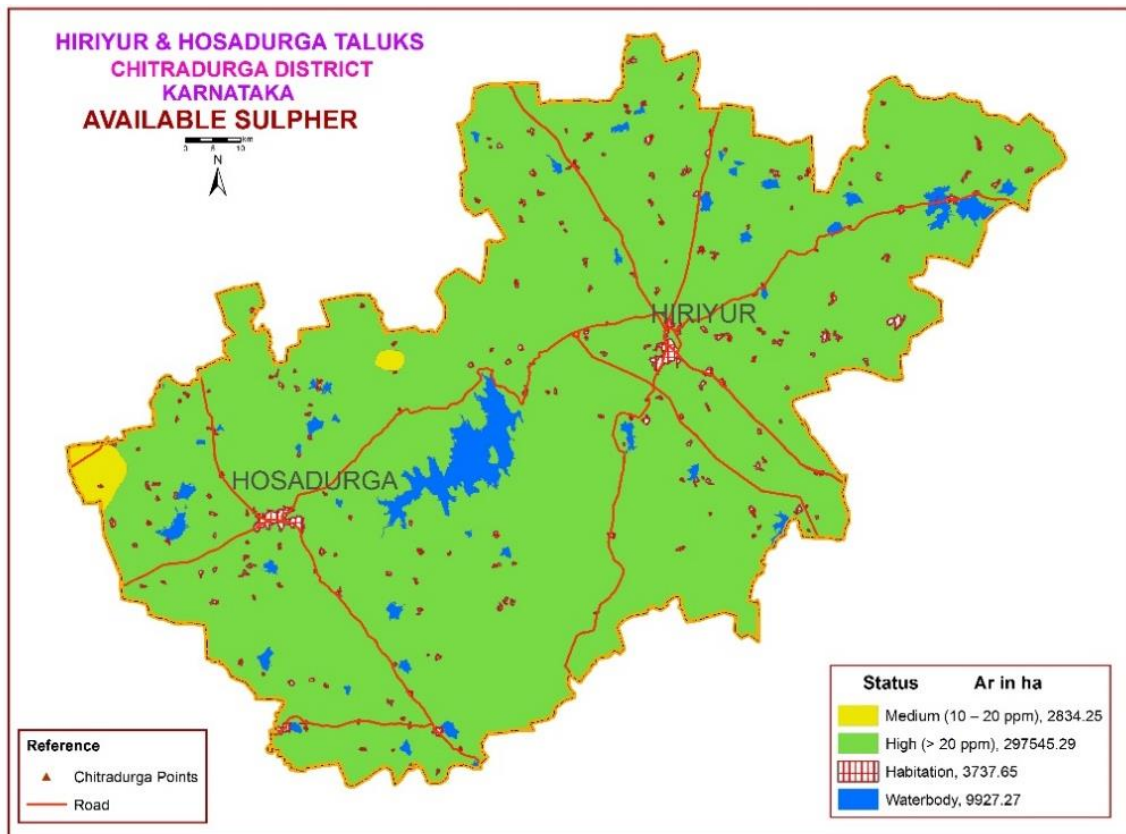
Available potassium content in Hiriyr and Hosadurga taluks was found to be medium in 1,56,897 ha area, followed by low in 91,342 ha area, and about 52,139 ha area was high (Fig. 6). In case of medium potassium fertility soils, application of the recommended dose of fertilizer is recommended, whereas in low K fertility soils, application of 125 per cent of the recommended dose is recommended and in high K fertility soils 75 percent of the recommended dose is recommended to crop production.

**2.6 Available sulphur (S) content**

Available sulphur content in Hiriyr and Hosadurga taluks was high in 2,97,545 ha area, and a little area of 2834 ha was medium (Fig. 7). Reduce the continuous use of fertilisers that contain sulfur, such as Ammonium Sulfate and choose non-sulfur-based alternatives like Urea for nitrogen needs. Minimise the application of agricultural gypsum in sulphur-rich soils, as it contains Calcium Sulfate.



**Fig. 6:** Available potassium status in Hiriyr and Hosadurga taluks



**Fig. 7:** Available Sulphur status in Hiriyr and Hosadurga taluks

### **3.REFERENCES**

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