

**A
Project Proposal
on
Mapping and Acreage Estimation of
Horticultural Crops at Block Level Using
Remote Sensing & G.I.S. Techniques**

Submitted to:

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1.0 INTRODUCTION

India is second largest producer of both fruits and vegetables next to China. Total production of fruits has been estimated at 44.04 million tons from 3.72 million ha. Vegetables occupy an area of 6.20 million ha with a production of 9.3 million per annum. Agriculture is the foundation for economic growth, employment creation and foreign exchange earnings in India. The horticulture sector contributes about 13.7% in Indian GDP (Gross domestic product) and horticulture contributes more than 30.4% in agriculture GDP.

Reliable and timely information of orchard plantation acreage is crucial for the overall management of demand supply scenario. Further, this information is also essential for taking important decision with regards to storage, transportation, marketing and determining a pricing policy as well as to improve the horticultural crops Census. Presently no reliable information exists in state with regards to acreage under major fruits. The technology of remote sensing has capabilities to generate such type of information by using high resolution satellite data. Remote sensing is an efficient tool for providing reliable & timely information along with repetitive coverage and it is cost effective also for mapping and estimating the horticultural crops area under different types of orchard plantation. Hence, it is proposed to take up the mapping and acreage estimation of orchard plantations at block level in selected districts.

India ranks first in acreage as well as production of mentha oil in the world. The mentha plant possesses odoriferous and volatile substance which occur as essential oils, gum, excaudate, balsam and oleo-resin in one or more parts, viz. root, wood, bark, foliage, flower and fruit.

Mentha cultivation has big export potential to fetch foreign currency. Reliable information on location and extent of different categories of landuse/landcover and information with respect to area and location about the Mentha crop is not available presently which is very much essential to planners. Keeping in view of its importance and uses in different industries and export potential the acreage estimation under mentha crop is proposed to be taken up in major growing districts of Uttar Pradesh using remote sensing technique.

2.0 EXPERIENCE OF RSAC-UP

Remote Sensing Applications Centre-UP is carrying out crop acreage and production estimation related studies every year, since 1988-89 for major agricultural crops of U.P., as a part of a national level project (CAPE), sponsored by Ministry of Agriculture and Dept. of Space, Govt. of India. The Centre is providing acreage & production estimates of Wheat, Paddy, sugarcane

and mustard crops annually in the selected districts of the state. By applying this technology over the years, the RSAC-UP has gained the necessary expertise in this field.

Besides the crops acreage and production estimation, recently RSAC-UP has done the mapping and acreage estimation of horticultural crops for Sitapur, Hardoi, Saharanpur, Mau, Allahabad, Ballia, Kaushambi, Meerut, Muzaffarnagar & Basti districts. The mapping & acreage estimation of horticultural crop at block level are being done for Moradabad, J.P. Nagar, Balrampur, Bahraich, Shravasti & Ghazipur districts.

3.0 OBJECTIVES

The major objectives of the project are:

1. Mapping of different types of orchard plantation at block level.
2. Acreage estimation of different types of orchard plantation at block level.
3. Mapping of Mentha crop at block/district level.
4. Acreage estimation of Mentha crop at block/district level.

4.0 STUDY AREA

(A) **Fruit Crops-** Twenty one districts of Uttar Pradesh are proposed to be taken up for mapping and acreage estimation of different types of orchard plantation at district level. Name of districts are given below:

Sl. No.	Year	District Name
1	2017-18	Pratapgarh, Sant Ravidas Nagar, Mirzapur, Chandauli, Bareilly, Shahjahanpur and Budaun.
2	2018-19	Farrukhabad, Bijnor, Gautam Budh Nagar, Aligarh, Etah, Etawah and Kannauj.
3	2019-20	Allahabad, Muzaffarnagar, Mainpuri, Firozabad, Gonda, Jhansi and Hamirpur.

(B) **Mentha Crop-** 9 districts of U.P. Pradesh are proposed to be taken up for mapping & acreage estimation of mentha crop during the year 2017-18.

Sl. No.	District Name	Sl. No.	District Name
1	Badaun	6	Pilibhit
2	Bahraich	7	Rampur
3	Barabanki	8	Shahjahanpur
4	Bareilly	9	Sitapur
5	Moradabad		

5.0 PROJECT DURATION

The entire Project work is planned to be completed in three years duration, and accordingly about 07 districts are supposed to be taken up for study every year.

6.0 REQUIREMENT DATA

Resourcesat-2 LISS-IV high resolution cloud free satellite data (cloud free having spatial resolution of 5.8 m) and PAN (Cartosat-1) are proposed to be used for orchard plantation mapping. Further, Resourcesat-2 LISS-III satellite data are proposed to be (having spatial resolution of 23.5 m.) used for Mentha acreage estimation.

7.0 METHODOLOGY

Identification and discrimination of fruit crops/land cover classes require quantitative use of subtle difference in their spectral data and hence the proposal study rely mostly on computer based digital image processing technique.

The acreage estimation procedure is broadly based on identified representative sites of orchard plantation / land cover classes on the image, supplemented by the ground truth data collected through GPS (Lat./ Long. etc). Delineation of different types of orchards plantation will be resulted in form of classified output, which will be followed by generation of area statistics of different orchard types using by image processing/Arc-GIS software.

7.1 GROUND TRUTH DATA COLLECTION

Ground truth data collection will be carried out in all the districts under the study. However limited ground truth data collection/ verification of crops is required and orchard types information will be collected during the ground truth period.

7.2 DIGITAL ANALYSIS

The digital analysis will be attempted at RSAC-UP computer laboratory, over the state-of-the-art computer system availed with image processing S/W. The digital analysis consists of steps viz. rectification of satellite scenes with respect to SOI Toposheet or with rectified images, extraction of AOI image of district / blocks and delineation of different orchard with the coincidence of GPS Lat. Long. reading. MXL classification technique will be used for mentha crop acreage estimation by using image processing software.

7.3 ACREAGE ESTIMATION

The acreage estimation of different fruit orchard plantation like Mango, Guava, Aonla, Ber, Banana and Citrus etc. will be estimated at block level by the super imposing the block boundary of the district over the delineated orchards area, whereas Mentha crop acreage will be estimated only at district level.

7.4 ACCURACY ASSESSMENT

A fixed percentage of the training sites having known ground truth will be kept as "blind sites" and remaining sites will be used for delineating the orchard at block level. The accuracy of acreage estimation at block level is expected to be come out as more than 90 per cent.

8.0 OUTPUTS OF THE PROJECT

Through digital analysis of the satellite data, the following outputs are proposed to be generated:

- Area estimates of different types of orchards at block level.
- Thematic maps showing location and spatial coverage of different types of orchard at block level along with with respective technical report.
- Acreage estimation of mentha crop at district level along with respective thematic map & technical report.

9.0 BUDGET

The estimated cost of the project is Rs. 5812730.00/- (Rs. Fifty Eight Lac Twelve Thousand Seven Hundred and Thirty only). The major part of the budget is required for procuring latest high resolution satellite data, computer service charges for digital analysis and Ground truth collection. The detail of budget requirement is as under (Table -1):

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Table 1: DETAILS OF BUDGET REQUIREMENT

Sl. No.	Particulars	Expected Expenditure (Rs.)
1.	(i) Satellite data cost @ Rs. 4170.00 per Scene of LISS IV Required Scenes = 65 Scenes.	271050.00
	(ii) Satellite data cost @ Rs. 4440.00 per Scene of PAN (Carto-1) Required Scenes = 250 Scenes.	1110000.00
	(iii) Satellite data cost @ Rs. 3520.00 per Scene of LISS III Required Scenes = 14 Scenes.	49280.00
2.	Man Power Salary:- for 3 years 2 Project Scientists @ Rs. 32000/-per month	2304000.00
3.	Ground Truth /T.A.&D.A. charges	700000.00
4.	Software Purchase / Maintenance Charges	300000.00
5.	Computer Processing Charges	300000.00
6.	Miscellaneous Contingency	100000.00
7.	Report writing , Printing & Stationary	150000.00
8.	Overhead Charges @10% of project cost	528400.00
	Grand Total Cost	5812730.00

10. Note:

The Project work will be initiated only after the funds are received in the Centre from the sponsoring agency.

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