© 2018 IJSRSET | Volume 4 | Issue 4 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section : Engineering and Technology

Advisory System for predicting production regions for Apple and Potato

Megha K. Patel[1], Hiteishi M. Diwanji[2]
[1]M.E. (I.T.) Student, I.T. Department, L.D. College of Engineering, Ahmedabad, Gujarat, India
[2]Associate Prof., I.T. Department, L.D. College of Engineering, Ahmedabad, Gujarat, India

ABSTRACT

Weather advisory helps for feasibility of transportation risks and future production/production regions. In Weather advisory weather data are consider as an input and according to weather condition production regions as classified for particular crop. This system will help in making future projections and consumptions and make scenarios for demand and supply. This system works on the premise of image (raster) operations as geo-spatial layer provided to the system and weather data. This system is design for apple and potato; it has been tested with available weather, and soil moisture data. For apple it has been tested with the available data for shimla district of Himachal Pradesh and for potato and it has been tested with the available data for Gautambuddhnagar district of Uttar Pradesh.

Keywords: Weather Data, Soil moisture data, Advisory

I. INTRODUCTION

An advisory system can be developed using various analytical services like rainfall prediction, crop recommendation, procure agro inputs recommendations, supply chain management, crop disease alert, fertilizer recommendations, etc. based on agricultural and weather data. The role of domain expert/ agricultural scientist is to generate recommendations and constitute decision policies based on analytical results. Weather data and soil moisture data are consider in this system for predicting production regions for particular crop.

II. METHODS AND MATERIAL

Advisory System characteristics:

2.1 Apple Advisory:

For apple advisory January and December month weather data are consider in the process. According to the temperature in January and December month system can predict the production regions for apple. Apple advisory gives the classified output in raster format according to the regions. Only weather data is considered for generating the output. According to the output value decision maker can predict that where good production regions are and where poor production regions are for apple. Output is tested for shimla district of Himachal Pradesh.

Step 1: Find out mean temperature of December and January month.

Step 2: Calculate chill accumulation value.

1. Regions where January mean temperature is between 59-63 degrees F.
    - Total chill accumulation= 3547-54(January mean temperature)
2. Regions where January mean temperature is between 48-58 degrees F.
    - Total chill accumulation= 3547-54(January mean temperature)

3. Regions where January mean temperature is below 48 degrees F.
    - Total chill accumulation= 4280-68.8(December+January mean temperature/2)
4. When mean temperatures between December and January differed by more than 6 degrees F.
    - Total chill accumulation= 4280-68.8(December+January mean temperature/2)

Step 3: Classify the regions according to the chill accumulation value.

Class 1: Very good Production (Optimum chilling)

- Chill accumulation value is between 1030-1230

Class 2: Good Production (low chilling)

- Chill accumulation value is between 800-1030

Class 3: Good Production (higher chilling)

- Chill accumulation value is between 1230-1500

Class 4: Poor Production (lower chilling)

- Chill accumulation value is below 800

Class 5: Poor Production (higher chilling)

- Chill accumulation value is more than 1500

Step 4: According to the classes generate classified Raster file.

2.2 Potato Advisory:

For potato advisory decision maker enters sowing date of potato and according to that date weather data are consider in the process. According to the temperature in that period, system can predict the production regions for potato. Potato advisory gives the classified output according to the regions. Weather data and soil moisture data are considered for generating the output. According to the output value user can predict that where good production regions are and where poor production regions are for potato.

Step 1: Find out mean temperature for selected time period.

- Start date of weather data = sowing_date + 65 days
- End date of weather data = sowing_date + 95 days

According to start date of weather data and end date of weather data consider WRF file (Weather data file) and find out mean temperature for that period.

Step 2: Classify the regions according to the mean temperature value.

- **Generalized constrain**

min_mean_temp > 10. Celsius

max_mean_temp < 30 degree Celsius

- **Classification:**

Class 1: Lower production due to lower temperature

- mean_temp < 15 degree Celsius

Class 2: Good production

- 15 degree Celsius <= mean_temp <= 20 degree Celsius

Class 3: Lower production due to higher temperature

- mean_temp > 20 degree Celsius

Step 3: Classify the regions according to the soil moisture data (Not compulsory).

- Soil moisture data is only checked for Good production regions which is generated in previous step.
- Soil moisture data files is selected according harvesting date/sowing date.

Case 1: Harvesting date is given by user

From harvesting date to continuous 7 days check soil-wetness index for good production regions.

Case 2: Harvesting date is not given by user

From (sowing_date + 100 days) to continuous 7 days check soil-wetness index for good production regions.

Final Classification:

1. **Class 1: Lower production due to lower temperature**
    - mean_temp < 15 degree Celsius
2. **Class 2: Good production**

- 15 degree Celsius < mean_temp < 20 degree Celsius
- Soil_wetness_index < 0.7

3. **Class 3: Lower production due to higher temperature**
   - mean_temp > 20 degree Celsius
4. **Class 4: Production affected due to high soil moisture**
   - 15 degree Celsius < mean_temp < 20 degree Celsius
   - Soil_wetness_index > 0.7

Step 4: According to the classes generate classified Raster file.

III. RESULTS AND DISCUSSION

3.1 Apple Advisory:

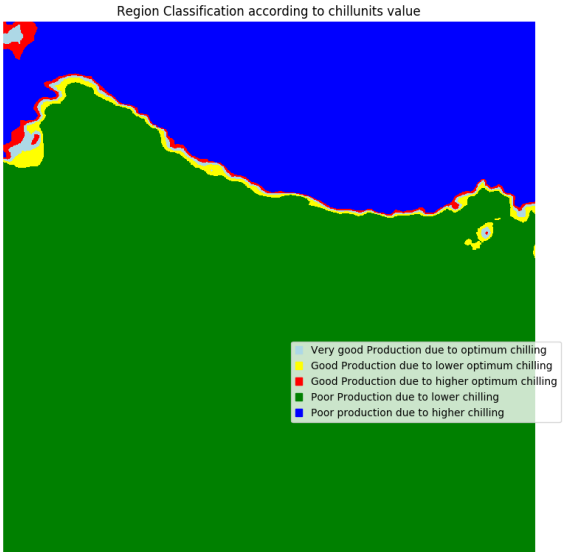

Figure 1. Apple Advisory Output according to weather data of year 2011-12

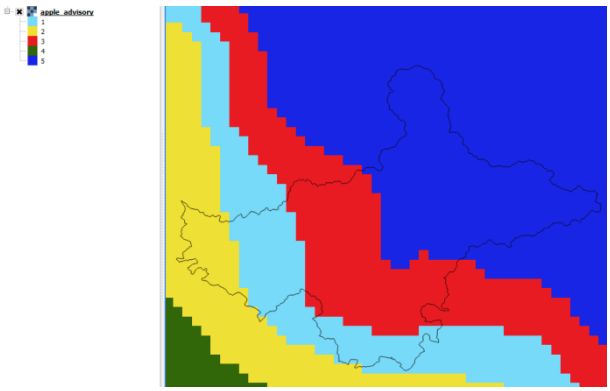

Figure 2. Apple Advisory production regions classification for Shimla

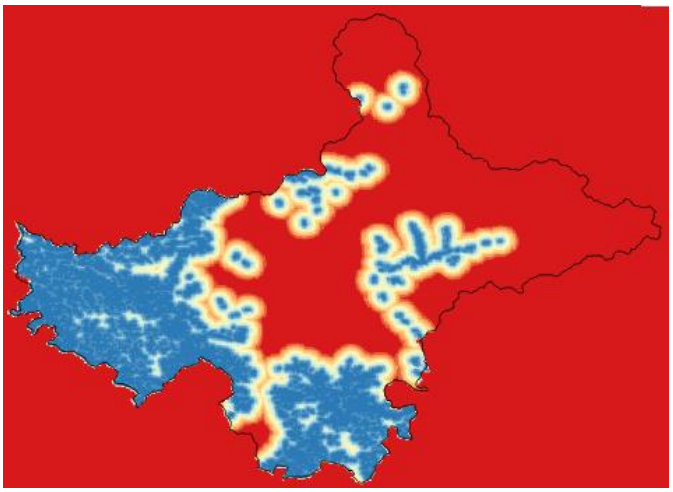

Figure 3. Apple production regions of Shimla for validating the output

3.2 Potato Advisory:

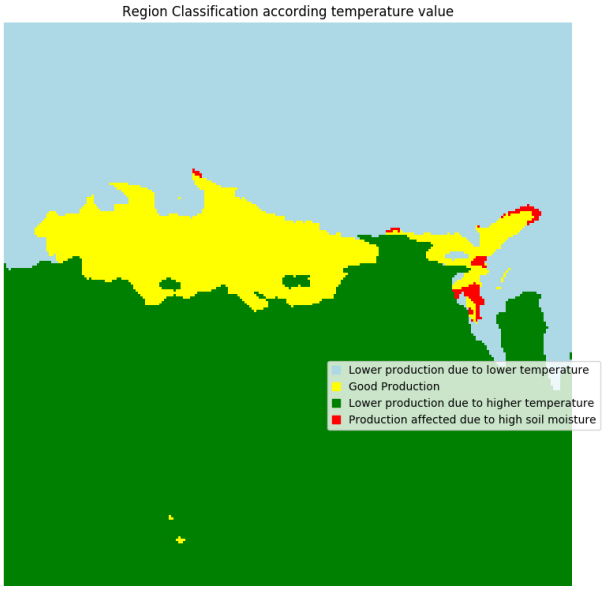

Figure 4. Advisory output with soil moisture data

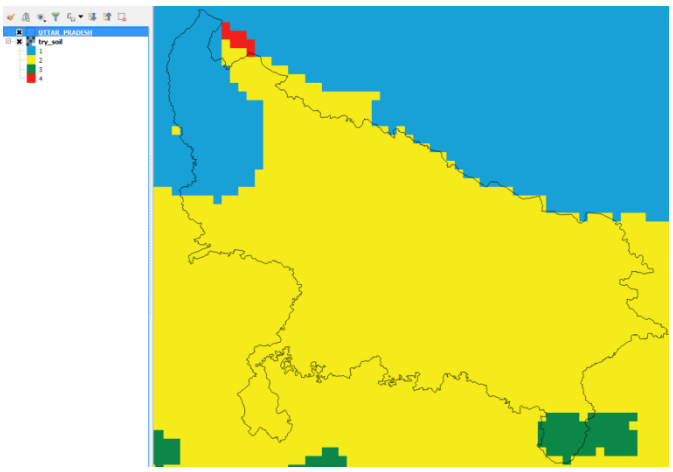

Figure 5. Potato Advisory production regions classification with soil moisture for Uttar Pradesh

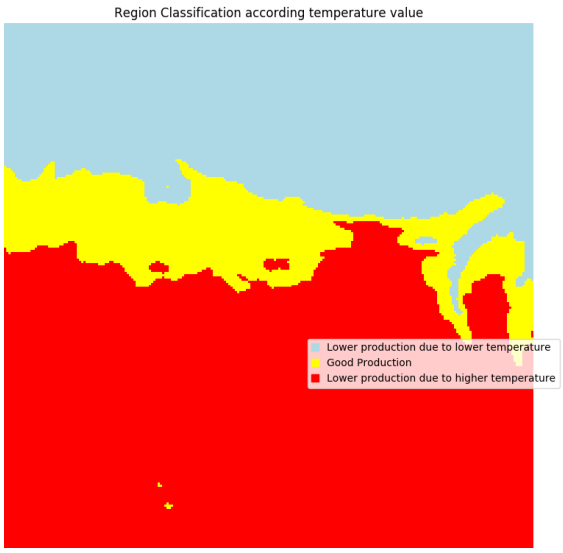

Figure 6. Potato Advisory output without soil moisture data

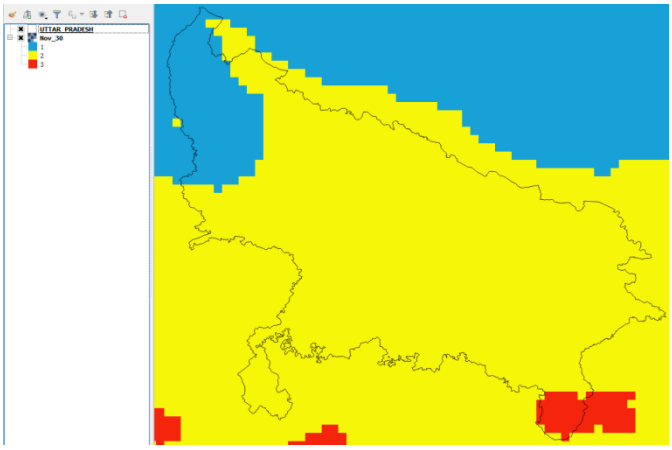

Figure 7. Potato Advisory production regions classification without soil moisture for Uttar Pradesh

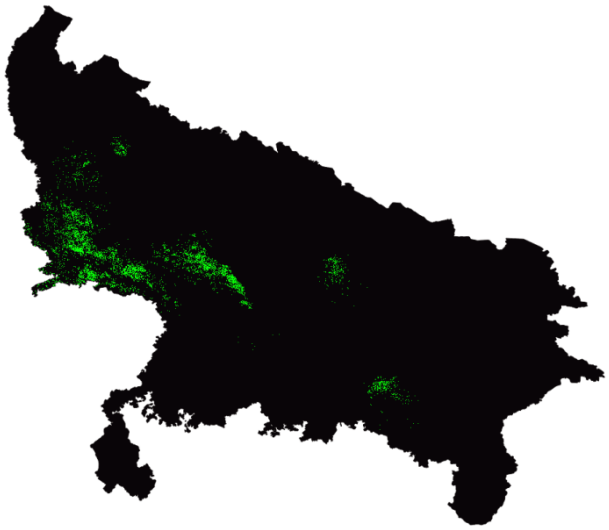

Figure 8. Potato production regions of Uttar Pradesh for validating the output

IV. CONCLUSION

This System will help decision makers to make a decision about a particular horticulture crop in order to decide about production regions. Weather advisory developed for crop production estimation.

V. REFERENCES

[1]. Chilling Accumulation: its importance and Estimation URL: www.agrilife.org
[2]. Handbook on horticulture statistics 2014
[3]. Big Data Analytics Architecture for Agro Advisory System by Purnima Shah, Deepak Hiremath and Sanjay Chaudhary