

Agro Advisories a Boon for Crop Planning on Real Weather Basis in Scaracity Zone of Maharashtra

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Abstract

More than 70% of farms in Scarcity Zone of Maharashtra are small and marginal and are thus vulnerable to climate variability. Some factors, such as increased temperatures and longer droughts periods, are likely to depress production. Managing climate risks is a major challenge of today and for the future. To extend the period of forecast for 3-7 days i.e., medium range weather forecast for the benefit of farming, community the India Meteorological Department has been issuing district level medium range forecast to the 127 agro-meteorological field units in the country. Under this project apart from weather forecasts, agro-advisories based on weather are also being issued for the benefit of farming community by the AMFU's. Advisories are farmers bulletin, which take into account the prevailing weather, soil and crop condition, weather forecasts and, suggest measures to minimize the losses (crop or livestock) and effective utilization of inputs (irrigation, fertilizers pesticides etc.) and also suggest contingent crop planning. The following points are to be kept in mind for preparing effective agro-advisory bulletins: Identification of weather sensitive field operations, Accurate weather forecast taking into cognizance local weather. Real time information on crops (major crops, varieties, sowing time, phonological stage, status of pests and diseases etc.). Reliable source of information. Crop weather calendars, easily understandable language. The feedback is collected from the contact progressive farmers, on usefulness of the advisories as well as suggestions for its improvements. Systemtic study conducted by this unit on economic impact of the project in six villages in Solapur District revealed that there is a benefit of 12- 23% due to adoption of agromet advisories. The contingency plans are needed if following conditions prevail : Failure of south-West Monsoon, Delayed onset or early withdrawal of monsoon, Deficit or erratic rainfall, Damage to crops due to cyclones floods etc. Crop loss due to droughts, Insufficient supply of irrigation water or late release of canal water, Long dry spells, Heat or cold waves, Severe pest or disease outbreaks due to favorable weather conditions. Medium range weather forecast is useful in issuing location specific weather based Agro-advisors to tailor the agricultural operations. By closely monitoring seasonal conditions and using medium range weather forecast an effective contingency cropping strategy is possible. Timely dissemination of these advisories/ contingency crop plans/measures will help the farmers to maximize the yield by optimum use of inputs and enhance the economic returns of the farmers.

Key words : Crop planning, advisories.

In Scarcity Zone of Maharashtra, the (5.2 million hectare) *kharif* crops depend mainly on seasonal monsoon rains. Yields are understood to vary in response to the variable timing of the commencement and conclusion of the rainy season, prolonged dry spells within the rainy season, and flood damage to crops from events of high rainfall intensity. Current vulnerabilities to climate are strongly correlated with climate

variability, in particular precipitation variability. These vulnerabilities are largest in semi-arid and arid low-income countries, where precipitation and stream flow are concentrated over a few months, and where year-to-year variations are high. The number of hydro-meteorological hazards (droughts, floods, wind storms etc.,) have significantly increased in recent decades from 195 (1987-1998 average) to 365 (2000-2006 average), indicating that climate-related disaster risk is increasing. Extreme climate

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events (droughts, floods, cyclones) regularly affect multiple sectors including agriculture, food security, water resources and health. More than 70% of farms in Scaracity Zone Of Maharashtra are small and marginal and are thus vulnerable to climate variability. Some factors, such as increased temperatures and longer droughts periods, are likely to depress production. Managing climate risks is a major challenge of today and for the future.

Agromet advisories are one such means to pass on climate risk management information to mitigate the losses incurred by farmers. Unfavorable weather conditions like delayed monsoon, intermittent dry spells, prolonged droughts and extreme weather events like heat waves, floods and cyclones etc., are major concerns to the Indian farmers. The advance prediction of these weather events, and dissemination of contingent crop planning measures on real time basis using modern information and communication technologies would help the farmer immensely in reducing the crop losses under aberrant weather situations and also taking-up suitable contingency measures. Farmers who incorporate the forecast products in their climate risk management are getting benefited.

Materials and Methods

Agromet advisories ; Despite considerable technological advances, Indian agriculture is still subject to vagaries of the weather. The short-range forecasts (24 hours in advance with an outlay for 48 hours), though useful for certain applications, are inadequate for planning weather-based agricultural practices because, longer reaction time is required for implementing the precautionary measures. Information on impending weather 3-10 days in advance is vital for effectiveness of modern farming practices like sowing of weather sensitive high yielding varieties, need based

application of fertilizers, pesticides, insecticides, irrigation and harvest planning. Therefore, medium range forecasts are needed to provide sufficient lead-time for the farmers to plan their agricultural operations based on weather based agro-advisories and thereby enhance agricultural production (Gadgil,1989).

To extend the period of forecast for 3-7 days i.e., medium range weather forecast for the benefit of farming, community the India Meteorological Department has been issuing district level medium range forecast to the 127 agro-meteorological field units in the country (Singh *et al.*, 1999). Under this project apart from weather forecasts, agro-advisories based on weather are also being issued for the benefit of farming community by the AMFU's. Advisories are farmers bulletin, which take into account the prevailing weather, soil and crop condition, weather forecasts and, suggest measures to minimize the losses (crop or livestock) and effective utilization of inputs (irrigation, fertilizers pesticides etc.) and also suggest contingent crop planning.

Presently, the IMD will provide district specific medium range weather forecast valid for coming 4 days on every Tuesday and Friday. Based on the forecast received from IMD the nodal officer or his associate will prepare the final forecast on quantitative rainfall, tendency in maximum and minimum temperatures, wind speed and direction, cloud amount and relative humidity valid for next 4 days beginning 8.30 a.m. on Tuesday, by looking in to the local conditions.

Result and Discussion

Agro-advisory services at ZARS, Solapur : Initially to implement the programme envisaged above, the Department of Science and Technology has sanctioned a project for MPKV on "Experimental Agromet Advisory

Services for Scaracity Zone Of Maharashtra” at 1994 on the basis of that the All India CO-
 Rahuri, Dist ,Ahmadnagar during the year Ordinated Research Project on Agro-

Table 1. Contingent crop planning for scarcity zone of Western Maharashtra

Occurrence of rainfall	Normal Crops / Cropping system	Crops / Cropping system
Second fortnight of June (24 and 25 MW)		All <i>kharif</i> crops and intercropping system
First fortnight of July (27 and 28 MW)	Sole Crop	Pearlmillet, Setaria, Amaranthas, Groundnut, Castor, Pigeonpea, Horsegram, Sunflower
	Intercropping system	Pearlmillet+ Pigeonpea (2:1), Sunflower + Pigeonpea (2:1) Clusterbean + Pigeonpea (2:1) Castor + Clusterbean (1:2)
Second fortnight of July (29 and 30 MW)	Sole crop	Sunflower, Pigeonpea, Horsegram Setaria, Castor, Pearlmillet
	Intercropping system	Sunflower + Pigeonpea (2:1), Clusterbean + Pigeonpea (2:1), Pearlmillet+ Pigeonpea (2:1)
First fortnight of August (32 and 33 MW)	Sole crop	Sunflower, Pigeonpea, Castor, Horsegram
	Intercropping system	Sunflower + Pigeonpea (2:1), Castor + Riddegourd (Mixed crop)
Second fortnight of August (34 and 35 MW)	Sole crop	Sunflower, Castor
First fortnight of September (36 and 37 MW)	Sole crop	<i>Rabi</i> sorghum for fodder and grain

Table 2. The cropping pattern on the basis of depth of soil and available soil moisture

Depth of Soil (cm)	Available soil moisture (mm)	Crops and varieties with duration (days)
< 7.5	15-20	Grasses(Marvel -8, 2 cuttings) and dryland horticulture (Ber, Custard apple, Anola, Pomegranate, Drumstick etc.)
7.5 – 22.5	30-35	Grasses(Marvel -8, 2 cuttings) , Kharif :Horse gram (Sina, Man) Mothbean (MBS-27), Castor (VI-9), Agroforestry & dryland horticulture.
22.5-45	40-65	<i>Khariif</i> I. Sole Cropping : Sunflower (SS-56) ,Pearlmillet (Shradha), Pigeonpea (BDN-2), Castor (VI-9), Groundnut (JL-24), Cotton II. Inter Cropping : Sunflower (SS-56) + Pigeonpea (BDN-2,), Pearlmillet (Shradha ,) + Pigeonpea (BDN-2).
45-60	60-150	<i>Rabi</i> : <i>Rabi</i> Sorghum (M.35-1), Safflower (Bhima), Sunflower (SS-56), Gram, (Vijay).
> 60	> 150	Double Cropping : <i>Khariif</i> Blackgram (T-9) Greengram (Phule M-2) Cowpea for fodder Pearlmillet (Shradha) Sunflower (SS-56) Pearlmillet (Giant bajra) Sorghum for fodder (Ruchara) <i>Rabi</i> Rabi Sorghum (M.35-1) Safflower (Bhima) Sunflower (SS-56) Gram (Vijay) Sunflower (Bhanu) Gram (Vikay) Safflower (Bhima)

meteorology (AICRPAM) Solapur has started Advisory Services for Solapur district which was published buy every week in local News Paper and broad casted by All India Radio. Solapur and also very good feedback response from farming community on phone.

Mode of preparation on agro-advisory bulletins (AAB) : The Agrometeorological Field Unit (AMFU) unit, with the Agro-meteorologist as the Principal Nodal Officer for MPKV, ZARS, Solapur is functioning at Agricultural Research Station, Solapur. An expert committee (panel of subject matter specialists) drawn from different disciplines including livestock and poultry has been

constituted to help in preparation of Agro-advisories based on impending weather. Taking this into cognizance and considering the location specific crop information, diagnostic visits of the Scientist, DAATT centers, Farmer Awareness Programmes, Scientist in Farmers Fields etc., the expert committee prepares the agro-advisory bulletin.

On the basis of local agro-meteorological and farming information and the weather forecasts from IMD, the subject matter specialists discuss about the options and consequent effects, and then decide the advice for the action by the farmers in respect of the items related to their expertise. All these together constitute the

Table 3. Crop varieties for contingent crop planning for scarcity zone of Maharashtra

Season/Crop	Variety
Kharif	
Kharif Sorghum (Improved varieties)	CSH-1, CSH-5, CSH-6, CSH-9, CSH-13, CSH-14, CSH-16, CSH-17, CSH-18, CSH-21, CSH-23, SPH-1567
Kharif Sorghum	SPV-462, CSV-13, CSV-15, CSV-17, PVK-801, CSV-23, (Hybrids)
Sunflower	SS-56, SS-2038 (Bhanu), Morden (Improved variety)
Sunflower (Hybrid)	KBSH-1, LDMRSH-1, LDMRSH-3, MSFH-8, MSFH-17, KBSH-44, Phule Raviraj
Pearlmillet	Shradha, Saburi, Shanti
Greengram	Phule Vaibhav, Kopergaon No. 1, BPMR-145, AKM-8802
Blackgram	TPU-4, TAU-1, BDU-1
Cowpea	Phule Pandhari, Shweta (for green fodder)
Pigeonpea	ICPL-87, Vipula, BSMR-853, BSMR-736, AKT-8811, Maruti (ICP-8863)
Horsegram	Seena, Man
Setaria	Arjun
Kidneybean	MBS-27
Groundnut (Kharif / Summer)	JL-501, SB-11, JL-24, TAG-24, TG-26, JL-220, JL-286
Soybean	DS-288 (Phule Kalyani), JS-335, MACS-124, MACS-450, PK-1029
Rabi	
Rabi Sorghum	Phule Maulee, Phule Vasudha, Phule Chitra, Phule Anuradha, Parbhani Moti
Chickpea	Vikas, Vishwas, Vijay, Digvijay, Virat, KAK-2
Sweet sorghum	SSV-84, HES-4, CSV-19, CSH-22, SKSSV-22, Phule Uttara
Safflower	Phule Bhima, Phule Kusuma, Sharda, Girna, NARI -6, NARINH-1, DSH-129
Groundnut (Rabi)	TPG-41

advisory, which must be as simple as possible in terms of the language and easily understandable by the farmers.

Dissemination of AAB : Currently, in Maharashtra, agro-advisories are being issued for nine agro-climatic zones *viz.*, South konkan zone, North konkan zone, Western ghat zone, Sub-mountain Zone, Western Maharashtra plain zone, Western Maharashtra scarcity zone, Central Maharashtra, Central Vidarbha and Eastern Vidarbha of Maharashtra. A composite bulletin covering all the regions of state of Maharashtra. is also being issued both in English as well as local Language (Marathi) and also very regularly the AICRPAM centre fills this information on www.cropweatheroutlook website of CRIDA, Hyderabad.

Content of agro-advisories : The content

of these advisories varies with location, season, weather, crop condition and local management practices. This may include

- Crop wise farm management information tailored to weather sensitive agricultural practices like field preparation, time seeding, irrigation, fertilizer, herbicide or insecticide application, harvesting, marketing etc.,
- Special warnings for taking appropriate measures for saving crop from aberrant weather.
- Location specific package and practices for cultivation of different crops suitable for the agroclimatic zone relevant to that period.
- Information or caution on outbreak of pests and diseases under prevailing or forecast weather conditions
- Problems related to animal health etc.,

Farmer details information	Provided weather forecast	Used forecast information	Savings /Advantage/Benefits /
Shri.Vivek Bhangre (2018) AP: Sarole Tal: Mohol Dist: Solapur	Expected within 24 hr Rainfall	Spraying immediately for disease control	To the extent of saved losses Rs. 40,000/- per acre. Other who had no forecast failed.
Shri.Mahadeo Aware (2019) AP: Sasur Tal: Barshi Dist: Solapur	Expected is to occur only after two days Rainfall	Completed the harvesting operation of soybean crop before commencement of rain	Produce got Rs. 1800/- per quintal (since the produce was not damaged by rain) as against Rs. 1200 of others who had no idea of the coming rain.
Shri. Dattaraya Mali (2019) AP: Konheri Tal : Mohol Dist: Solapur	Occurrence of Rainfall in the evening / night time	Completed spraying in morning hours	On grape he could control shoot up of downy mildew disease, as well as save from washout of the chemical by providing sufficient drying time, whereas others could not be benefited
Shri.Saybanna Kumbhar (2018) AP: Maniknal Tal: Jat Dist: Sangli	Expected Rainfall is after 2 to 3 days	Took up dry sowing	Due to subsequent rains as per forecast., helped in good establishment of crop
Shri.Vishwas Jadhav (2019) AP: Hanjagi Tal: Akkalkot Dist: Solapur	In next 3 – 4 days No rainfall	Spraying was deferred	One spray saved Rs. 3000/- per acre. costing
Shri.Shashi Parlekar (2019) AP : Karamba Tal : S. Solapur Dist: Solapur	Expected dry spell extended	Curtailed sowing of rainfed maize from the planned 10 acres to only two acres	He had to provide irrigation as the forecast met out true.
Shri.Haridas Kathale (2018) AP : Sarole Tal: Mohol Dist: Solapur	Routine forecasting given	Sowing, spraying and harvesting	In timely management without tension of the coming weather. The good forecasts helped him and his co-farmers

The advisories also serve an early warning function, alerting producers to the implications of various weather events such as extreme temperatures, heavy rains, floods and strong winds etc.,

The following points are to be kept in mind for preparing effective agro-advisory bulletins:

- Identification of weather sensitive field operations
- Accurate weather forecast taking into cognizance local weather
- Real time information on crops (major crops, varieties, sowing time, phonological stage, status of pests and diseases etc.,)
- Reliable source of information
- Crop weather calendars
- Easily understandable language

The feedback is collected from the contact progressive farmers, on usefulness of the advisories as well as suggestions for its improvements. Systemic study conducted by this unit on economic impact of the project in six villages in Solapur District revealed that there is a benefit of 12- 23% due to adoption of agromet advisories.

Contingency crop plans : The contingency plans are needed if following conditions prevail:

- Failure of south-West Monsoon
- Delayed onset or early withdrawal of monsoon
- Deficit or erratic rainfall
- Damage to crops due to cyclones floods etc.,
- Crop loss due to droughts
- Insufficient supply of irrigation water or late release of canal water

- Long dry spells
- Heat or cold waves
- Severe pest or disease outbreaks due to favorable weather conditions.

The contingency strategies are to be based on location specific need and situation based (rainfed or irrigated). Within the region also they vary with soil types. 'Mahatma Phule Krishi Vidyapeeth' Zonal Agricultural Research Station, Solapur has made noble attempt to develop location specific contingency plans by monitoring the seasonal and crop conditions on real time basis and forecast weather of IMD, for the benefit of farming community to enable them to respond suitably and save the crops with reasonably good yields. Some of the contingency measures suggested during are as follows Table 1 to 3.

Conclusion

Medium range weather forecast is useful in issuing location specific weather based Agro-advisories to tailor the agricultural operations. By closely monitoring seasonal conditions and using medium range weather forecast an effective contingency cropping strategy is possible. Timely dissemination of these advisories/ contingency crop plans/measures will help the farmers to maximize the yield by optimum use of inputs and enhance the economic returns of the farmers.

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