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## Weather based agromet-advisory, crop contingency plans and find best management practices for selected villages of Aurangabad district

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**Abstract**

A study were, therefore, undertaken on adaptation of AAB. Agricultural production depends upon many factors, of which weather is the major factor. Weather varies with space and time, hence, its forecast can help to minimize the farm losses through proper management of agricultural operations. The complete avoidance of all farm losses due to weather factor is not possible but it can be minimized to some extent by making adjustments benefit to the farmers by suggesting them the suitable management practices according to the weather through timely and accurate information of weather forecast. Contingent cropping plans and best management practices are identified on the basis of weather based Agro advisory during *Kharif*. Season 2016 has been done. Thirty users of Agromet advisory services (AAS) and 30 non users of Agromet advisory services (non-AAS) were selected from two villages of Aurangabad district. Content of weather based AAB studied by using Agro-Advisory Bulletins of years 2016. A questionnaire as suggested by NCMRWF was circulated to farmers. The management practices suggested in advisory were easy to understand and can be easily adopted by the farmers on their farm. The inputs recommended in advisory are helpful to selected villages or nearby villages. The farmers also appreciated the management practices given in advisory like sowing, weed management, insect pest and disease management, fertilizer management, cultural practices, harvesting and storage.

**Keywords:** AAB, weather forecast, weather based, contingent, *Kharif*

**Introduction**

India is predominantly an agro-based country where agriculture production contributes nearly 13.7% of Gross domestic product (GDP). Much of the agricultural production in the country depends on the rainfall during the South-west monsoon period of June to September. The most important characteristic feature of the monsoon season the occurrence of widespread and sufficient large amount of rain spread over a period of 100 days over most part of the country. Each phase of agricultural activity from preparatory tillage to plant growth, harvest and storage is influenced by weather directly or indirectly (Bhatia, 1999) [2]. In India rainfed areas currently constitute 55 per cent of net sown area of the country. Even after realizing the full irrigation potential, more than half of the cultivated area will continue to remain rainfed. The 55 per cent un-irrigated agriculture supporting 40% human population, two third livestock population and contributing 40% to the food grain production of the country. But it is risky, vulnerable, diverse, and complex and under invested (NRAA, 2012) [5].

Weather simply refers to day to day meteorological condition, especially temperature, cloudiness and rainfall affecting a specific place. The growth of crop and their development are primarily governed by environmental conditions of soil and weather. The qualitative and quantitative improvements in crop production are intimately related to the prevailing conditions (Anonymous, 2009) [1]. The weather element includes temperature, precipitation and sunshine which are influencing the crop growth and yield. Weather assume significance in nearly every phase of activity from selection of crop varieties, time of sowing, transplanting, scheduling of irrigation, time of fertilizer application, using pesticides, harvesting process and storage decided by weather.

Adverse weather warning for the same would be useful to farmer for estimating the nature of the impending attacks based on the current conditions and past experiences. So, that they can

take suitable and remedial action and reduces losses. Agricultural production depends upon many factors, of which weather is the major factor. Weather varies with space and time, hence, its forecast can help to minimize the farm losses through proper management of agricultural operations. The complete avoidance of all farm losses due to weather factor is not possible but it can be minimized to some extent by making adjustments through timely and accurate information of weather forecast.

AAS an effective communication media for transfer of technology regarding climate changes information. AAS provides basic, timely and accurately pre-information of different climate and weather conditions of different crops. AAS helpful to farmers for increase interest, knowledge, adoption and impact of climate changes on agricultural practices. The healthy growth and yield of crops depend upon certain optimum conditions of weather with which the plant growth is concerned (Ramdas, 1996)<sup>[6]</sup>. Weather forecast and weather based agromet advisories help in increasing the economic benefit to the farmers by suggesting them the suitable management practices according to the weather conditions. A study were, therefore, undertaken on adaptation of AAB.

### Materials and Methods

The effort were made to adopt appropriate methods and procedure in order to reach reliable unbiased and practical conclusion. This chapter deals with description of procedure followed for carrying out the investigation. It contains the tools and technique employed for data collection, the data studying procedure adopted as well as the device used for analysis of data are also explained.

The present investigation was undertaken as "Weather based Agromet-Advisory, crop contingency plans and find best management practices for selected villages of Aurangabad district." The first investigation station (Shekta) is located between 19.83° N latitude and between 75.00° E longitude, second investigation station (Shiregaon) is located between 19.87° N Latitude and Longitude 75.00°. The elevation of both station is varies between 400 m to 500 m above mean sea level in Western Maharashtra Dry or Scarcity Zone of Maharashtra state.

Thirty farmers each comprising of AAS users and non-AAS users respectively from each of two villages were selected to form a total sample size of 60 respondents. Respondents were further categorized into marginal, small, medium and large farmers based on holding size for both the groups' viz., AAS and non-AAS holders. Farmers who are reading and following micro-level agro-advisories displayed by FIFs or receiving information from Department of Agriculture through bulk messaging issued by Department of Agrometeorology are termed as AAS farmers. While farmers not caring about display of AABs and not registered farmers in agro-advisory bulk dissemination found out weather based agromet-advisory, crop contingency plans and identified best management practices and dissemination of AAB through mass media communication agencies of weather information in case of personal cosmopolite source and through structured interview of farmers. AAB were issued by the AMFU, Parbhani. The content of weather based AAB studied by using last One year Agro-Advisory Bulletins. Preparation of a questionnaire as suggested by NCMRWF was circulated to farmers.

### Result and Discussion

The result obtained by the study and analysis are discussed under as following heads.

#### ❖ Weather based agromet advisory contents the following aspects

- 1) Field crops
- 2) Fruit crops
- 3) Vegetables
- 4) Cash crops
- 5) Animal Husbandry

The content of weather based AAB studied by using AAB of year 2016. Total 101 AAB issued by the GKMS unit Parbhani for Aurangabad district are presented in Table no. 01 and covered the different crops are given they are as follows.

Issued agromet advice for cotton crop covered the most of the time in issued AAB (64.8%) followed by Sorghum (48.6%), Soybean (47.52%) and the other crops like Red gram (33.48%), Green gram (33.48%), Black gram and Sugarcane (19.44%) respectively, Pearl millet (10.8%), maize (7.56%), sesame (7.56%), sunflower (6.48%) and Groundnut (5.04%) were covered.

Amongst the Fruit crops, Citrus spp. covered the most of the time in issued AAB i.e. (34.34%) followed by Banana plant (25.25%), Mango (22.5%), Pomegranate (16.16%), Ber and Sapota (12.12%) respectively, Guava (6.48%), and Grape plant covered very less time i.e. (1.08%) were covered.

While, amongst the Vegetable crops Chili covered the most of the time in issued AAB i.e. (32.32%), followed by Cluster bean and Cowpea (31.31%) respectively, Tomato (28.28%), Brinjal (27.27%) Bitter gourd (23.76%), Onion and Ginger (21.21%), Cauliflower and Ridge gourd (17.28%), Turmeric (16.2%), Spinach and Fenugreek (6.48%), Garlic (2.16%) Pea and Sugar beet covered very less time i.e. (1.08%) were covered.

Amongst all the flower crops most of the time Rose crop covered in AAB i.e. (9.72%) followed by Aster (7.56 %), Marigold (3.24%), Jasmine (2.16%), Gladiolus, Gaillardia and Tuber rose covered very less time i.e. (1.08 %) respectively were observed.

Other Fodder crops like Maize covered the most of the time in AAB i.e. (0.6 %) followed by Lucerne and Berseem (0.4 %) respectively and Sorghum covered very less time i.e. (0.2 %) were observed.

Amongst livestock management animal and poultry management practices based agromet advice incorporated in issued AAB were about (66.66 %), (4.04 %) respectively.

In 2016 from the available 101 AAB covers (78.78%) maximum and minimum temperature respectively, bulletins covers observed (72.72%) rainfall, cloud cover (71.71%) and highest RH-I and RH-II (100%) were observed.

Amongst bulletin covers forecasted maximum temperature and minimum temperature (99.45%) respectively, wind speed and direction both were same as (98.98%) and rainfall (75.75%) were forecasted.

It was also observed that the AAB livestock aspect also incorporated during issuing agromet message and the percentage of these aspects found Animal (66.66%) and Poultry (4.04%) were covered.

#### ❖ Crop contingency plans and best management practices suggested in advisory

The management practices suggested in advisory were easy to understand and can be easily adopted by the farmers on their

farm. The inputs recommended in advisory are helpful to selected villages or nearby villages. The farmers also appreciated the management practices given in advisory like sowing, weed management, insect pest and disease management, fertilizer management, cultural practices, harvesting and storage.

### 1. Interculturing operations

The operations like hoeing- In village rainfall receipt was very less and therefore in Agromet advisory it was suggested to carry out the timely intercultural operations like hoeing to conserve the soil moisture and to control the weeds and with this many farmers carried out the suggested timely intercultural operations in standing crops like Cotton, Soybean, Pigeon pea, Ginger *etc.*

### 2. Plant protection operations

The operations like spraying of pesticides- In the month of September there was receipt of rainfall which leads to the incidence of some pests like aphids, thrips, mealy bug and disease like reddening on cotton crop. For control of these pests and diseases it was regularly suggested in Agromet advisory the spraying of pesticides on Cotton crop and the farmers adopted the spraying operations as suggested in AAB. Mainly for the control of pests like aphids, thrips in AAB suggested the spraying of Dimethoate 30% @ 10 ml or Thiamethoxam 25% @ 2.5 gm or Acetameprid 20% @ 2 gm in 10 liter of water and for the control of mealy bug spraying of Chloropyriphos 20% @ 30 ml or Propanophos 50% @ 20 ml in 10 litre of water. In AAB for the control of reddening disease of cotton suggested the spraying of 2% Urea, 0.5% MgSo<sub>4</sub> and 0.2% Boron. For the control of pests of Soybean Spraying of Quinolphos 25% @ 20 ml. or Chloropyriphos 20% @ 20 ml. or Emamectin benzoate 5 AC @ 3.5 gm. per 10 liter water was suggested.

### 3. Crop residue management

The crop residue was used as surface mulching materials. The mulches are thermo insulators, have smother effect on weeds, protect the soil from rain drop impact, reduce salinization and barriers to vapor transfer thus conserve soil moisture. It is also beneficial for soil micro-organisms and on degradation adds organic matter to the soil.

### 4. Measurement of water table depth

The water table depth is one of the main factor that determining the economics of irrigation. Rapid increase in number of wells and tube wells has resulted in a situation where in large number of well owners are competing to extract water from the limited aquifers, with a concomitant lowering of the ground water table. Deepening of water tables in areas where less rain water is harvested than necessary to compensate the withdrawal is likely to lead ultimately to a permanent water deficit situation. Hence, it will be worthwhile to construct the structures like farm pond, sunken pond *etc.* to maintain water table. In many areas, overdraft of ground water aggravates surfacing of harmful fluorides and salts.

### 5. Farm keep fallow in *kharif* and wheat is sown in *rabi*.-

It refers to keeping the land vacant without raising any crop during a particular season/year. The main objective of fallow in rotation is to give rest to the soil and conserve the soil moisture in the field.

### 6. Moisture conservation practices-

As there was a long dry spell in the month of August during the critical growth stages of crop, in AAB it was suggested to carry out the water conservation practices like opening of furrow 25-30 DAS after every two rows of crops for long duration and wide spacing crops like cotton, pigeon pea and after every 4-6 rows of crop for short duration and short spacing crops like Sorghum, Soybean, Green gram, Black gram to conserve the rain water.

Some of the important following management practices suggested through advisories to the farmers for getting satisfactory crop yield during *kharif* season.

1. Soil moisture conservation practices wise; hoeing and opening of furrow during dry spell period.
2. Plant protection measures suggested for the control of pest in Pigeon pea, Cotton, Soybean and Sweet orange.
3. Fertilizer application and application of protective irrigation.

### Summary

1. The farmers have started taking interest in accessing information on the management of crops and animal husbandry.
2. The operational part of crop management and rainfall information has been the major aspects on which farmers were interested to get information.
3. Initial stage of the programme, sufficient numbers of farmers have been found to be benefitted through the agro-advisory service.
4. Hence, to provide the agro-advisory in a sustainable manner, convergence of such types of programmes with technical help from agricultural university through NICRA and KVK personnel is recommended as it will help uplift livelihoods of the farmers in a rapid way.

### Conclusion

1. It concluded that, Agro-advisory services have helped in bringing out substantial awareness among farmers about adoption of weather-based advisories, their timely availability and quality of service.
2. It has also helped in encouraging the adoption and use of modern agricultural production technologies and practices, in promoting weather based irrigation management, pest and disease management *etc.* along with greater use of post-harvest technologies.
3. Despite positive effects of AAS on adoption of improved production technologies and practices, marginal differences were found in the yield obtained by AAS and non-AAS farmers for some crops.

This may be attributed to certain other factors like shortage of capital, shortage of irrigation water, lack of adequate farmland, unfavourable weather patterns and problems of pests and diseases *etc.*

**Table 1:** the agro advice of AAB covered different agricultural disciplines with required crops of *kharif* season (2016-2017) issued by GKMS Parbhani center for Aurangabad district.**(A) Agronomical Crop**

A.C.	Perl millet	Groundnut	Sorghum	Cotton	Maize	Sesame	Soybean	Sugarcane	Wheat	Green gram	Red gram	Black gram	Sunflower
Number	10	5	45	60	7	7	44	18	12	31	31	18	6
%	10.8	5.04	48.6	64.8	7.56	7.56	47.52	19.44	12.96	33.48	33.48	19.44	6.48

**(B) Horticultural Crops**

Veg.	Chili	Tomato	Brinjal	Okra	Cluster Bean	Cowpea	Sugar Beet	Onion
Number	32	28	27	24	31	31	1	21
%	32.32	28.28	27.27	25.92	33.48	33.48	1.08	21.21

Veg.	Fenugreek	Ridge gourd	Turmeric	Ginger	Garlic	Pea	Cauliflower	Carrot	Bitter gourd	Spinach
Number	6	16	15	21	2	1	16	8	22	6
%	6.48	17.28	16.2	22.68	2.16	1.08	17.28	8.64	23.76	6.48

F.C.	Citrus	Guava	Pomegranate	Mango	Ber	Sapota	Grape	Banana
Number	34	6	16	9	12	12	1	25
%	34.34	6.48	16.16	22.5	12.12	12.12	1.08	25.25

Flower	Gaillardia	Rose	Marigold	Aster	Tuber rose	Gladiolus	Jasmine
Number	1	9	3	7	1	1	2
%	1.08	9.72	3.24	7.56	1.08	1.08	2.16

**(C) Fodder Crops (d) Livestock**

F. C.	Maize	Lucerne	Berseem	Sorghum	Livestock	Animal	Poultry	Fish
Number	0.6	0.4	0.4	0.2	Number	66	4	-
%	0.6	0.4	0.4	0.2	%	66.66	4.04	-

**Table 2:** Weather based Agromet-Advisory given to farmers

Date	Advisory given	Reason behind the release AAS
12/05/2016	Initiate selection of variety for sowing/ seed treatment	Optimum rainfall is received for sowing
19/5/2016	Sowing across slope	To reduce soil erosion due the Runoff.
26/5/2016	One deep ploughing with mould board plough followed by two harrowing's	Prevailing dry spell
09/06/2016	Soil and water conservation work	Prolonged dry spell from 27 June to 23 July expected
16/06/2016	Spraying of insecticide	Incidence of insect pest attack on crop like soybean, cotton.
24/06/2016	Sowing of Cotton, Soybean, Red gram with information of seed rate, variety	To avoid wastage of seed and time
01/07/2016	Fertilizer application	As per soil test based
02/07/2016	Fertilizer quantity after one month	Top dressing dose
05/08/2016	Light harrowing, hand hoeing, between rows of crop like Maize, Red gram, Soybean.	Prevailing dry spell
12/08/2016	Spraying potassium nitrate (13:0:45) on soybean, Tur.	Prevailing dry spell
18/08/2016	Spraying insecticide (trizophos) against girdle beetle, roughing out wilt affected Red gram crop plant	Highly incidence of girdle beetle and wilting occurred
25/08/2016	Intercultural operations	To reduce evaporation through soil crusting
01/09/2016	Spraying against pod borer of Red gram & Cotton	Red gram crop are in tillering / flower initiation stage
08/09/2016	Control measure against white grub management	Losses by white grub in crop like ginger, soybean is occurred in many areas of Aurangabad district
15/09/2016	In fallow land intercultural operation are done across the slope	Aim to conserve soil moisture in soil for <i>Rabi</i> crop
22/09/2016	Hoeing between rows of cotton	In situ Moisture conservation
29/09/2016	Varietal selection / Seed treatment for <i>Rabi</i> crop. Regarding harvesting & storage of Soybean.	Sowing of <i>rabi</i> crop is conducted in village
06/10/2016	Spraying of insecticide on Red gram crop	Incidence of leaf minor, semi looper occurred on Red gram crop

**Table 3:** Cultural practices information given in AAB

Practice	Management
Land selection	Avoid fields with a history of weed problems.
Crop selection	Grow the most competitive crops in fields with a history of weed problems.
Crop rotation	Rotate between vegetables and non-row crops such as Alfalfa. Rotate between vegetables in different botanical categories.
Adapted crop varieties	Select crop varieties adapted for your area.
Proper row spacing and plant densities	Use row spacing and plant densities that assure rapid crop-canopy closure
Correct planting times	Plant crops when soil temperatures favor rapid germination and emergence.
Appropriate fertility, disease, and insect management	Vigorous, healthy crops are more competitive against weeds.
Mulch	Natural mulches are difficult to use over large acreages. Synthetic (plastic) mulches are useful to manage weeds within the row in warm-season crops consider disposal problems when using plastic mulches.

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