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Short Communication

Weather based prediction model for time of occurrence of vegetative flush in mango *cv.* Alphonso for Konkan region of Maharashtra state

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Mango cv. Alphonso bears vegetative flush in October immediate after withdrawal of SW monsoon. Extension of monsoon up to last week of October and off-season rainfall during first fortnight of November causes delay in vegetative flush in mango cv. Alphonso. This leads to subsequent delay in flowering and fruit development phenomenon of mango cv. Alphonso and ultimately crop yield. It is mandatory to protect the vegetative flush immediately after emergence against insect pests and diseases during aberrant weather condition which will affect the flowering, fruit setting and there subsequent stages. Considering importance of weather parameters for emergence of vegetative flush in mango cv. Alphonso an attempt has made to predict the vegetative flush in mango across South Konkan Coastal Zone of Maharashtra State by using different meteorological variables. Forecasting of vegetative flush in Alphonso mango will help mango growers to take advance action to protect vegetative flush by adopting appropriate measures as well as it will helpful for extension workers in formulation of effective Agro-advisory to mango growers.

Study area

The thirty Alphonso mango plant were selected for study at Agronomy Farm, Department of Agronomy, College of Agriculture, Dapoli, Dist. Ratnagiri (M.S.) situated on the west cost of Maharashtra between $17^0$45' N and 73°26' with altitude of 250 m. Recommended fertilizer dose of 50 kg FYM + 1.5 kg N + 0.5 kg P_2O_5 + 1 kg K_2O per plant per year during June to July months is applied to selected during study period. Necessary plant protection measures were applied as and when required. The commencement of new vegetative flush initiation date was recorded for all mango plant cv. Alphonso from 1997-98 to 2014-15. The daily weather data of maximum temperature, minimum temperature, morning and afternoon relative humidity, rainfall, rainy days, bright sunshine hours and rate of evaporation recorded at agrometeorological observatory situated on Instructional farm for years 1997-98 to 2011-12 was utilized for computation of weekly average.

The weekly data for different weather parameters of preceding season were used for correlation and regression analysis. The statistical analysis was done as per the method suggested by Gomez and Gomez (1976). The Multiple Linear Regression (MLR) models are applied when two or more independent variables are influencing the dependent variable. It uses as few variables or all variables for prediction as necessary to get a reasonably accurate forecast. An important issue in regression modeling is the selection of explanatory variables which are really influencing the dependent variable. There are many methods for selection; stepwise regression analysis is frequently used variable selection algorithm in regression analysis. This is a modification of forward selection, in which at each step all independent variables entered into the model previously are reassessed by their partial F-statistics. An independent variable added at an earlier step may now be redundant because of the relationships between it and latest variable entered in the model (Montgomery *et al.,* 2003).

Weather parameters and occurrence of vegetative flush

The coefficient of variance and standard deviation was 8.60 and 3.03, respectively for dependent variable i.e. vegetative flush in mango cv. Alphonso. It decides that the commencement of vegetative flush in mango cv. Alphonso will be during 37^{th} to 47^{th} meteorological week with minimum yearly variation between emergencesof vegetative flush. The correlation coefficient between emergence of vegetative flush in Alphonso mango with weather parameters *viz*., maximum temperature (r=0.681) and bright sunshine hours (r=0.568) recorded three weeks before occurrence of vegetative flush in mango cv. Alphonso were significant and positively correlated with emergence of vegetative flush in Alphonso mango, whereas weather parameters *viz*., minimum temperature (r=-0.562), afternoon relative humidity (r=-0.816), rainy days (r=-0.791) and rainfall (r=-0.724) recorded three weeks before occurrence of vegetative flush in mango cv. Alphonso were significant negatively correlated with vegetative flush of mango cv. Alphonso (Table 1).

Table 1: Weather parameter and three week before vegetative flush in Alphonso mango at Dapoli location and correlation coefficient of weather parameter with vegetative flush of Alphonso mango (15 years study)

Year	Start veg. flush (M.W.)	Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)	BSS (hrs/day)	Rainfall (mm)	Rainy days	Evapo (mm/ day)
1997-1998	43	25.8	20.8	95	72	8.0	0.0	0	3.7
1998-1999	47	31.9	19.2	96	68	7.6	2.6	0	3.3
1999-2000	39	27.7	22.6	96	86	3.0	111.3	7	2.8
2000-2001	40	28.7	20.4	95	77	6.9	3.1	0	5.0
2001-2002	38	28.0	22.5	65	89	4.9	45.0	5	3.7
2002-2003	37	27.3	23.1	96	89	2.7	120.5	7	2.8
2003-2004	43	30.4	23.1	95	82	5.0	79.8	1	1.5
2004-2005	41	27.4	19.8	94	77	4.7	61.0	3	3.5
2005-2006	46	31.5	19.6	95	58	7.7	0.0	0	3.9
2006-2007	44	31.2	22.4	97	81	1.1	7.0	2	3.6
2007-2008	45	33.5	19.3	97	53	7.2	0.0	0	6.1
2008-2009	39	30.2	28.1	98	86	3.8	105.8	3	3.2
2009-2010	40	29.1	23.0	98	88	2.6	73.1	3	2.3
2010-2011	43	32.0	22.8	97	78	7.0	72.8	3	3.5
2011-2012	44	31.3	22.2	89	69	6.3	0.0	0	3.9
Mean	41.93	29.73	21.93	93.53	76.87	5.23	45.47	2.27	3.52
C.V.	8.60	4.52	4.78	62.52	114.65	4.54	1994.4	5.80	1.06
S.D.	3.03	2.20	2.26	8.18	11.08	2.21	46.23	2.49	1.07
Correlation	1.000	0.681**	-0.562*	0.292	-0.816**	0.568*	-0.724**	-0.791	0.280

** Significance at 1% * Significance at 5%

Multiple regression equation for occurrence of vegetative flush in mango

The step down multiple regressions for commencement of vegetative flush in mango cv. Alphonso was developed by using particular meteorological weeks in which vegetative flush was observedover fifteen years as a dependent character and weather parameters as independent character. For commencement of vegetative flush in mango cv. Alphonso, important weather parameters before three weeks were maximum temperature, afternoon humidity, rainfall and evaporation,which contributed the variability for vegetative flush and its applicability was 94 per cent and was significant at 1 per cent level of significance as given below. Haldankar *et al.* (2002) reported that, the integrated influence of minimum temperature, rainfall and rainy days contributed the variability in cashew yield with 67 per cent applicability at Vengurla location of Maharashtra. Also PrasadaRao *et al.* (1999) reported that, the rainfall distribution and cloud amount at Kerala influenced the phenology of cashew and its production. Parmar *et al.* (2012) reported that, the high night temperature, which prevailed during December to February at Navsari (Gujarat) during flower induction, caused poor flowering in mango. Rathod and Mishra (2017) reported that, the stepwise regression analysis for forecasting area and production of mango in Karnataka performed better as compared to the univariate ARIMA model.

Relationship between rainfall and vegetative flush

Relationship between weekly observed rainfall three weeks before vegetative flush and actual meteorological weeks of vegetative flush was drawn and depicted in Fig. 1. The probability of delay in occurrence of vegetative flush was more when no rainfall was observed three weeks before vegetative flush in mango cv. Alphonso, however receiving

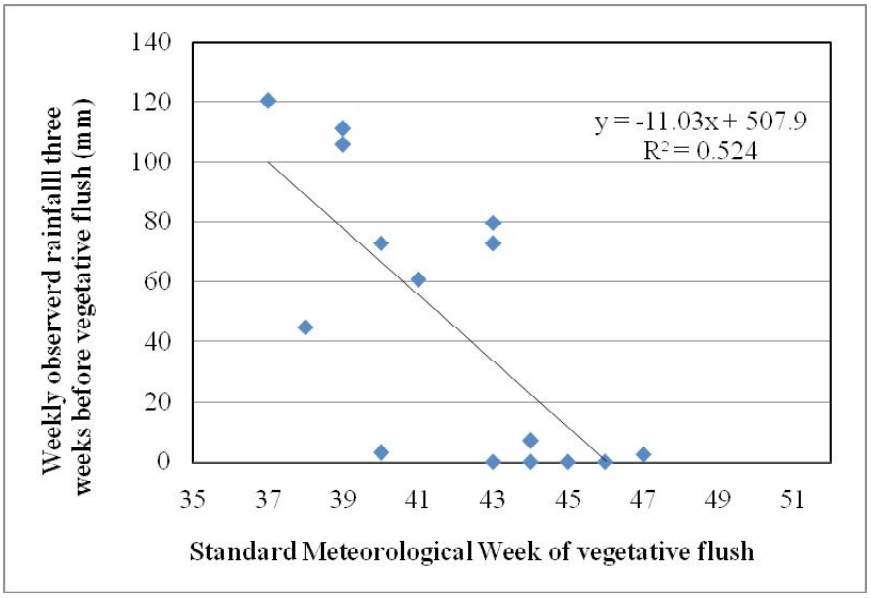

Fig. 1: Relationship between weekly observed rainfall three weeks before vegetative flush and actual meteorological weeks of vegetative flush

rainfall three week before occurrence of vegetative flush enhance the chances of inducing earliness in occurrence of vegetative flush in mango cv. Alphonso.

CONCLUSION

The present study on weather parameter indicated that behavior of maximum temperature, afternoon humidity, rainfall and evaporation three weeks before initiation of vegetative flush determines the time of emergence of vegetative flush of mango cv. Alphonso. The event of vegetative flush has also influence on succeeding phenological stages *viz.* period of occurrence flowering, fruit development and maturity of fruits in south coastal Konkan region of Maharashtra state. Delay in emergence of vegetative phase may lead to further delay in maturity of fruits. Further, receiving rainfall three weeks before occurrence of vegetative flush also enhance the chances of inducing earliness in occurrence of vegetative flush in mango cv. Alphonso.

REFERENCES

Gomez, K.A. and Gomez, A.A. (1976). Statistical procedures of agricultural research. 2nd Ed. John Wiley and Son. New York pp. 357-423.

Haldankar, P.M., Deshpande, S.B., Chavan, V.G., Nadkarni, H.R., Patil, B.P., Joshi, G.D. and BhaskaraRao E.V.V. (2002).Crop weather association in mixed population of cashew hybrid. *J. Plantation Crops*., 30(3): 37-40.

Montgomery, D.C., Peck, E.A. and Vining, G. (2003). Introduction to Linear Regression Analysis, *3rd Ed. John Wiley and Sons (Asia) Pvt. Ltd.*

Parmar, V.R., Shrivastava, P.K. and Pate, B.N. (2012). Study on weather parameters affecting the mango flowering in south Gujarat. *J. Agrometeorol.,* 14(SI): 351-353.

Rao, G.S.L.H.V.P., Giridharan, M.P., Naik, J.B. and Gopalkumar, C.S. (1999). Weather influenced damage on cashew production. A remedy. *The Cashew,* XII(4) : 36-43.

Rathod, S. and Mishra, G.C. (2017). Weather based modeling for forecasting area and production of mango in Karnataka. *Int. J. Agric. Environ. Biotechnol.,* 10(1): 149-162.

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