Journal of Agrometeorology 16 (2) : 238-239 (December 2014)

Short Comminucation

Forecast models for groundnut using meteorological variables in Kolhapur, Maharashtra

B.S. DHEKALE[1],S. SHERAZ MAHDI[2*], T. P. DALVI[1] and P. K. SAWANT[1]

[1]Agrimet Division, IndianMeteorological Department, Pune 411005, Maharashtra- India

[2]IndianMeteorological Department, Rambagh, Srinagar, 190 015, J & K- India

E-mail : sheerazsyed@rediffmail.com

In a recently launched scheme "Forecasting of Agricultural Output using Space, Agrometeorology and Land based observations (FASAL)", by the Department of Agriculture and Cooperation (DAC), Ministry of Agriculture (MoA), Govt. of India,Indian Meterological Department (IMD) in collaboration with Agromet field units located in State Agricultural Universities/ICAR institutes/IITs has started issuing national/state/district level multiple in-season crop yield forecast for eleven major crops since 2010 (Ghosh et al., 2014). Under this project crop yield forecast is being issued based on the statistical and crop growth simulation models.

Groundnut being the main oilseed crop of Maharashtra is cultivated over an area of 353 thousand hectares and has productivity 1282 kg ha^{-1} (Anonymous, 2013). The effect of weather parameters at different growth stages of the crop may help in understanding their response in terms of final yield and also provide a forecast of the crop in advance of harvest (Amender and Lalmohan, 2005). Hence the present study was undertaken to investigate the feasibility of estimating the productivity of groundnut based on weather variables using past weather and yield data for Kolhapur district of Maharashtra.

To meet the objective,25 years (1985-86 to 2010-11) groundnut yield data collected from State Department of Agriculture, Pune was used. Corresponding data on weather parameters during the crop growth period were collected for two stations of Kolkapur (Kolhapur and Kolhapur (SH.P) from India Meteorological Department, Pune and AMFU, Radhanagri.

Following the procedure as reported by Gosh *et al.*, (2014), the yield forecast models were developed using detrended crop yield and partial crop seasonal data through generation of new weather indices whichwere developed using correlationbetween crop yield and weather parameter of particular week as weight. Yield forecast models were also developed by regressing groundnut yield on original highly correlated weather variables using stepwise regression. Data up to 2008-09 was used for development of model and 2009-10 and 2010-11 was used for validation purpose.

The forecasting models were developed using both methods, weather indices and weekly weather variables, which then were compared for their fitness. The coefficients of multiple determination of the models at different weeks of forecast was used as criteria for selecting the best fitted model (Table 1). The model developed with simple weather variables revealed that the minimum temperature during of 24th SMW. Rainfall during 35th and 37thSMW (pegging to pod development) along with the Maximum temperature during 30th SMW altogether accounted for 80% variation in the groundnut yield of Kolhapur district.

The second model developed with derived the parameters revealed that weighted combined effect of maximum temperature with rainfall (2131) and humidity (2141) was found explain 85% variation on groundnut yield

The developed models were validated for year 2009 and 2010.The reliability of the models was judged by the forecast errorpercentage and root mean square error (RMSE) shown in Table 2.

The weather indices model showed lower RMSE and forecast error (%) value as compared to weekly weather variable model. Hence weather indices model can be used for prediction of groundnut yield in Kolhapur district.

ACKNOWLEGEMENT

The author are thankfull to all scientist of Agrimet division, IMD, Pune for their valuable guidance.

REFERENCES

Amrender, K. and lalmohan, B.(2005).Forecasting model for

Table 1: Groundnut yield forecast model

Model	Model equations	Coefficient of determination (R^2)
Weekly weather variable model	$Y = 264.16 + 11.32\ T_{min}(24) + 9.67\ Rain\ (37) + 5.55\ Rain\ (35) - 3.88\ T_{max}(30)$	0.80
Weather indices model	$Y = 1452.28 + 0.127\ Z131 + 0.962\ Z141 + 0.520\ Z20$	0.85

Table 2: Comparison between actual and forecasted yield of groundnut

Model	Year	Actual yield (kg ha^{-1})	Forecasted yield (kg ha^{-1})	Absolute forecast error (%)	RMSE
Weekly weather variable model	2009	1370	1470	7	117
	2010	1847	1620	13	
Weather indices model	2009	1370	1398	2	104
	2010	1847	1851	0.12	

yield of Indian Mustard (*B. juncea*L.) using weather parameters, *Ind. J. Agric. Sci.*, 75(10): 688-690.

Anonymous, (2013). Economic Survey of Maharashtra, Directorate of Economics and Statistics, Planning department, Govt., of Maharashtra, pp. 83.

Gadgil, S. (2000). Farming strategies for a variable climate-An Indian case study, In: Proceedings of the International forum on Climate Prediction, Agriculture and Development, April 26-28. International Research Institute for Climate Prediction, New York, USA, pp.27-37.

Ghosh, K., Balasubramanian, R., Bandopadhyay, S., Chattopadhyay, N., Singh, K., and Rathore, L. S. (2014). Development of crop yield forecast models under FASAL-a case study of *kharif* rice in West Bengal, *J. Agrometeorol.*, 16(1):1-8

Lobell, D.B. and Burke, M.B. (2010). On the use of statistical models to predict crop yield responses to climate change. *Agric. Forest Meteorol.*, (In press), doi:10.1016/j.agrformet.

Parmar, R.S., Rathod, U.S. and Raj, M.P. (2013). Effect of rainfall distribution on the productivity of groundnut in Jamnagar district of Gujarat state. *J. Agrometeorol.*, 15(special issue-I): 181:182.

Prasad, P.V.V., Craufurd, P.Q., Kakani, V.G., Wheeler, T.R and Boote, K.J. (2001). Influence of high temperature during pre- and post-anthesis stages of floral development on fruit-set and pollen germination in peanut. *Australian J. Plant Physiol.*, 28(3):233-240.

Prasad, P.V., Boote, K.J., Allen L.H. Jr., and Thomas, J.M.G. (2003). Super-optimal temperatures are detrimental to peanut (*Arachishypogaea* L.) reproductive processes and yield at both ambient and elevated carbon dioxide. *Global Change Biology*, 9: 1775-1787.

Received : September, 2013; Accepted: July, 2014