

Effect of diurnal variation of atmospheric and elevated levels of carbon-dioxide and photosynthetically active radiation on intercellular concentration and rate of photosynthesis in maize and safflower

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ABSTRACT

A field experiment was conducted during *rabi* 2003 to study the effect of elevated levels of CO₂ and PAR on intercellular CO₂ concentration (C_i), net photosynthetic rate and their interrelationship in maize and safflower at different growth stages. The highest concentration of intercellular CO₂ was recorded at 1200 and 1400 hrs and lowest concentration of intercellular CO₂ was found during early hours in the morning (08 00 hours) irrespective of levels of CO₂ and PAR at all the stages of maize and sunflower. The higher rate of net photosynthetic rate was observed in active vegetative stage (11.7 to 49.1 μmol CO₂ cm⁻² sec⁻¹) compared to knee high and flowering stages of maize and during late vegetative stage (21.6 to 47.2 μmol CO₂ cm⁻² sec⁻¹) in safflower compared to early vegetative and flowering stage. The optimum levels of CO₂ and PAR for maize were 650 μmol CO₂ mol⁻¹ and 960 μmol m⁻² s⁻¹ respectively and for safflower were 650 μmol CO₂ mol⁻¹ and 1100 μmol m⁻² s⁻¹ respectively. A combination of 650 μmol CO₂ mol⁻¹ and 960 μmol m⁻² s⁻¹ of PAR for maize and 650 μmol CO₂ mol⁻¹ and 1100 μmol m⁻² s⁻¹ of PAR for safflower were found optimum levels. A positive correlation between the intercellular CO₂ concentration and net photosynthetic rate in maize and safflower was found throughout the crop growth period.

Key words: CO₂, PAR, intercellular CO₂ concentration, net photosynthetic rate

Studies on diurnal air temperature pattern from daily maximum and minimum by estimating the parameters of sinusoidal and exponential models on weekly basis under semi arid climate of Hyderabad

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ABSTRACT

The sinusoidal and exponential models for day time and night time temperature pattern have been fitted to weekly mean hourly air temperature data recorded at Hayathnagar Research Farm of CRIDA, Hyderabad during 1995-2007 using an automatic weather station. The lag coefficient 'a' of the sinusoidal model ranged between 1.150 – 4.372 and night time temperature coefficient 'b' of exponential model ranged between 2.175 – 4.334 during 1st - 52nd standard meteorological weeks. Coefficient of determination (R²) values were between 0.892 – 0.995 for the sinusoidal and between 0.931 – 0.988 for the exponential model. Goodness of fit was tested by Student's 't' statistics as well by the graphical plots of observed vs. estimated mean weekly diurnal temperatures during 2008.

Key Words: Sinusoidal, exponential, model, air temperature

Effect of different meteorological parameters on germination of inoculum of teliospores of *Tilletia indica* in rice-wheat rotation system in Punjab, India

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ABSTRACT

Dynamics of inoculum in relation to meteorological parameters affecting occurrence of Karnal bunt epidemic in wheat in Punjab was studied during the years 2001-02 and 2002-03. There existed an intricate relationship between germination of teliospores of *Tilletia indica*, the causal organism of karnal bunt of wheat and meteorological parameters. The ambient and soil temperature showed negative relationship with the germination of teliospores. Increase in temperature beyond 25 °C resulted decrease in germination of teliospores. Relative humidity had significant positive relationship with germination of teliospores and maximum teliospore germination was recorded when relative humidity was more than 75 per cent. Different models were developed for prediction of disease possibility based on viability of inoculums depending on meteorological conditions. Based on humid thermal ratio, the best fit models for forecasting viability and germination of teliospore of *T. indica* throughout the year and during crop season were developed which explained 65 to 89 per cent and 60 to 52 percent of the variations, respectively.

Key words: *Tilletia indica*, model, meteorological parameters, karnal bunt, wheat

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Crop adaptation and modeling for prediction of essential oil production and quality of a geraniol rich strain of *Cymbopogon commutatus* (Steud.) Stapf [RL(J) CC1] using energy indices

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ABSTRACT

Occurrence of geraniol and geranyl acetate as major chemical constituents were reported in the essential oil of *Cymbopogon commutatus* (Steud.) Stapf. A selectant having H⁸⁰% total geraniol and coded as RRL (J) CC1 has been studied by way of quantifying growth response coefficient values of morpho-economic character, which was 1.0 signifying its good adaptability under subtropical environment. Leaf adaptation has been quantified as phyllochron which exhibited 519.6 and 775.6 degree-days for production of single mature leaf during first and second harvests, respectively. Floral adaptation was quantified as photoperiod response coefficient b=412 (degree-days/day-length). Based on two years pooled observation (2001-2002), regional crop models have been developed for prediction of essential oil production and its quality as total geraniol content (%) by using most-efficient energy indices viz., phenothermal index and thermo/photo ratio.

Key words: Adaptation, *Cymbopogon commutatus*, Degree-days, Energy summation indices, Geranyl acetate, Heat use efficiency, Phenothermal index, Phyllochron, Thermo/photo ratio.

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Modeling effects of rainfall and soil moisture on productivity of maize and black gram in semi-arid vertisols

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ABSTRACT

Based on field experiments conducted during 1998 to 2006 in a semi-arid vertisol at Arjia on maize and blackgram crop an attempt was made to assess the effect of rainfall received during June to September and the soil moisture at the times of sowing and harvest on the biological yield. The study was conducted in 3 blocks of maize, blackgram and maize + blackgram by superimposing 9 fertilizer treatments. The soil moisture at sowing and harvest and biological yield attained by treatments differed significantly based on ANOVA in different years. The treatment-wise regression models of yield through rainfall of June to September and soil moisture at sowing and harvest had a predictability of 0.62 to 0.98 in maize block, 0.73 to 0.98 in blackgram block and 0.54 to 0.98 in maize + blackgram block.

Key words : Rainfall, soil moisture, regression models

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Phenophase prediction model for wheat (*Triticum aestivum*) growth using agro meteorological indices sown under different environments in temperate region of Kashmir

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ABSTRACT

Field experiments were conducted during 2003-04 and 2004-05 on silty clay loam soils at research farm of Sher-e-Kashmir University of Agricultural Sciences and Technology- Kashmir, Shalimar to study the influence of sowing time on phenology and growth of the wheat cultivars and to develop the phenophases prediction model based on the agro meteorological indices. The treatment consisted of three dates of sowing and six cultivars of wheat. The results showed that the wheat sown under temperate region matured in 219 ± 10 days. Early sown wheat crop took more thermal time as compared to normal and late sown. The day length and bright sunshine hours also affected the occurrence of different phenophases of wheat cultivars. Accumulated thermal time ($r=0.94$) was best agro meteorological indices for prediction of flowering stage in wheat, while physiological maturity was predicted well by using helio thermal unit (HTU) ($r=0.95$). The heat use efficiency decreased with delay in sowing. The dry matter production (g/m^2) was linearly related with accumulated heat units, HTU and photo thermal indices

Key words: Wheat, phenophases, cumulative heat unit, heliothermal unit, photothermal unit.

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Rainfall and temperature trends at three representative agroecological zones of Bihar

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ABSTRACT

Rainfall and temperature trends were investigated at four stations representing three agroecological zones of Bihar using 45 years data except for Sabour (34 years) and Madhepura (43 years). Monthly, seasonal and annual precipitations as well as temperature (T_{max} and T_{min}) were analyzed for climate variability and possible trends using nonparametric Mann-Kendal statistic test. The results showed an increasing trend in rainfall and minimum temperature, on the contrary a decreasing trend for maximum temperature in the study area.

Key words: Rainfall, maximum and minimum temperature, Mann-Kendall test

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Floods and hazardous heavy rainfall in India: Comparison between local versus oceanic impact

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ABSTRACT

Generally, during the south-west monsoon season, several severe/ extreme weather systems form over India, leading to heavy rainfall. Such heavy rainfall result in floods for wider region of northern India, and, which, finally, causes loss of agriculture, human and animal's life, outbreak of diseases/ epidemics, and thus affecting national economy. An attempt has therefore, been made to analyze the disastrous events that occurred in the summer monsoon months over different states in India for the period 1981-2000. The analyses included the raining event which were active, but, caused due to- or without the monsoonal-systems that were formed in north Indian Ocean. Results showed that West Bengal was the mostly affected state during monsoon season, where both, local as well as monsoonal systems were equally responsible for heavy rainfall/ flood events. The local atmospheric phenomenon affected highly to Uttar Pradesh, West Bengal, Gujarat, and Maharashtra, whereas for systems that were associated with the north Indian Ocean and Bay of Bengal, the states of West Bengal and Orissa were the mostly affected states. From the study, it may be concluded that all the heavy rainfall related disastrous weather events formed over different states in India was not only due to systems developed over Oceans, rather, local atmospheric phenomena had equally important contributor of similar affects, particularly for northern and western India.

Keywords: Flood, heavy rainfall, hazard, local atmospheric phenomenon, oceanic impact

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Comparison of reference crop evapotranspiration methods in western part of Maharashtra state

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ABSTRACT

The Penman-Monteith equation presented by Food and Agricultural Organization (FAO56- PM) is considered as the standard method to estimate ET, and hence in this study, commonly use methods. viz. Modified Penman FAO-24, Hargreaves-Samani, FAO-24 Pan Evaporation, Blaney -Criddle, and FAO Radiation methods. The comparison were made on the basis of the least root mean square error and regression analysis. Out of six methods Hargreaves-Samani was found to be the most suitable method. As r^2 and RMSE between this method and Penman-Monteith method compared with other method were compared with it.

Keywords: Pomegranate (*Punica granatum* L.) reference crop evapotranspiration, climatic data and semi-arid region.

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Estimation of cotton yield based on weather parameters of Banaskantha district in Gujarat state

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ABSTRACT

The present investigation was undertaken to identify the quantitative relationship between weather parameters and district level yield of cotton and to develop preharvest forecast models for cotton yield. For this purpose 32 years weather and crop yield records of Banaskantha district were collected. It was found that the 26 week crop period model (using original weather variables, week wise approach) was recommended for pre harvest forecast due to higher R^2 value and lower simulated forecast error. The time trend, maximum temperature, morning and evening relative humidity have significantly affected on crop yield.

Key words: Cotton, prediction equation, forecasting, weather variables.

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Effects of dates of sowing on phenology, thermal and radiation regimes, and yield of wheat*

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ABSTRACT

To assess the effects of thermal and radiation regimes on wheat, a field experiment consisting of five dates of sowing starting from 20 November at weekly interval, was conducted. The crop sown on 20 November needed 113 days to attain maturity and with delay in sowing dates, maturity durations decreased upto 91 days in 18 December sown crop. The highest thermal and radiation regimes of 2095°C day for GDD, 15515°C day h for HTU, 31880°C day h for PTU and 2140 mmol m⁻² for PAR were associated with maximum yield from crop sown on 20 November. Accumulated global radiation and PAR during vegetative phase showed significant positive correlation, but during reproductive and grain filling phases they exhibited significant negative correlation with dry matter. Accumulated GDD during vegetative, entire growth period and grain filling period registered significant positive correlation with grain yield. Accumulated HTU, PTU, global radiation and PAR, prevailing during reproductive and grain filling phases, showed significant negative association with grain yield. Because of higher values of HUE, HTUE, PTUE, RAUE and PARUE, in terms of grain yield, amounting to 0.1614 g m⁻² GDD, 0.0219 g m⁻² HTU, 0.0104 g m⁻² PTU, 0.2220 g MJ⁻¹ and 0.1599 g mmol⁻¹, respectively, the 20 November sown crop was adjudged as the optimum time of sowing. R^2 of regression models was significant at 1% level, accounting for 97 to 99% variation in total grain yield.

Key words : GDD, PAR, phenology, wheat, yield and yield attributes

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Prediction of grain yield of wheat using canopy temperature based indices*

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ABSTRACT

Canopy temperature based regression models were developed for the prediction of grain yield of wheat. During the reproductive phase, all the canopy temperature based indices viz., canopy temperature (T_c), average canopy minus air temperature ($T_c - T_a$) and summation stress degree days (SDD) showed a negative and significant relationship explaining 71-87% variation in grain yield. These findings signify an ample scope of mid day canopy temperature as a possible tool for monitoring plant water status and grain yield prediction.

Key words : Air temperature, canopy temperature, grain yield, stress degree days, wheat

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Characterization of crop growing environment of chickpea in Haryana*

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ABSTRACT

The data on area, production and productivity of chickpea crop in different districts of Haryana were collected for 27 seasons (1978-79 to 2004-2005) to study characterization of crop growing environments. The data showed that there had been drastic decrease in area and production in north and central part of the state. The southern parts of the state showed comparatively less decrease or increase in area and production. There is no trend in the productivity. By analyzing the trends of recent years, the districts of Hisar and Bhiwani had high spread and high productivity during 1993-97 periods. Sirsa fell in medium spread and high productivity zone, whereas Mahendergarh, Jind, Gurgaon and Rohtak had low spread but high productivity. In the recent pentad (1998 to 2002), only Bhiwani district had high spread and medium productivity, whereas Sirsa and Hisar recorded medium spread but high productivity. Mahendergarh, Jind and Gurgaon fell in low spread and high productivity category, whereas Rohtak falls in low spread and medium productivity zone. Models have been developed to predict chickpea yield in Karnal and Mahendergarh districts.

Key words : Characterization, chickpea, growing environments

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Studies on yield limiting meteorological factors for production of rabi pigeon pea in West Bengal*

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ABSTRACT

Winter pigeon pea can be considered as an alternative to *boro* rice cultivation particularly in the places where over exploitation of ground water is a potential threat to sustainability. The present experiment was aimed at quantifying the meteorological factors that limit the cultivation of *rabi* pigeon pea particularly in the upland and medium land condition. The experiment was conducted for three consecutive years during 2003-06 in the University Farm at (BCKV) Kalyani W.B. The treatments comprised different dates of sowing at seven days interval between 20 September and 7 December. The influence of meteorological factors on phenological development and yield was statistically analysed. The results revealed that the length of vegetative phase was inversely correlated to the afternoon vapour pressure deficit, average BSH and diurnal variation in temperature. On the other hand, night temperature and daylength were negatively correlated with the reproductive duration. The regression analysis showed that bright sunny days with high atmospheric vapour demanded not only induced early flowering but they also had suppressed the grain yield. Higher accumulation of GDD and PTU during vegetative phase resulted in higher grain production. On the other hand, the average day temperature, night temperature and day length during reproductive phase had negative correlation with grain yield of pigeon pea. These parameters may be considered as limiting factors for higher production. Besides that, rainfall during March had severely hampered pod formation when sown late.

Key words : Grain yield, meteorology, phenophase, pigeon pea

Diurnal variation in temperature and humidity profile within sesamum canopy and its impact on growth process under different dates of sowing*

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ABSTRACT

An experiment laid out in simple RBD combined over dates of sowing (22nd Feb–D₁, 7th March–D₂ and 22nd March–D₃) and varieties (V₁–BT-894-3, V₂–Rama and V₃–BT-893-1) was carried out in three successive years (2004, 2005 and 2006) at BCKV, W. B. to find out temperature and humidity profile within sesamum canopy and their impact on various growth processes. Results revealed that different dates of sowing exposed the crop to different ranges of temperature and RH (above and below the crop). From PCR analysis it is evident that temperature and RH on all data points significantly affected the biometric parameters. This crop could not be sown after 7th March under West Bengal condition; both the flowering and capsule-setting would be adversely affected by higher temperature below the sesamum canopy.

Key words : Air temperature, relative humidity, sesame

Influence of weather parameters on pod yield of groundnut in middle Gujarat agro-climatic region*

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ABSTRACT

Field experiments were carried out during 1997 to 2007 at B. A. College of Agriculture, Anand with two dates of sowing (D₁ : Onset of south-west monsoon and D₂ : 15 days after onset of south-west monsoon), two cultivars (Robut 33-1 and GG-2) and two irrigation regimes (I₁ : Rainfed and I₂ : Irrigation at 50% ASM) for assessing the impact of weather parameters on pod yield of *kharif* groundnut. Results revealed that groundnut crop sown at the onset of monsoon performed better than late sown crop sown 15 days after onset of monsoon rain and on an average, the early sowing gave 21.4% higher pod yield. Robut 33-1 produced more pod yield than the local variety GG-2 in most of the years and on an average, Robut 33-1 yielded 21.6% higher pod yield. During the years of dry spells, irrigations applied at 50% ASM (I₂) recorded greater pod yield than the crop grown under rainfed condition (I₁). In case of crop sown at onset of monsoon, mean temperature during pod development phase showed significant positive correlation with pod yield, whereas in second sowing crop, minimum temperature at 50% pod development phase and sunshine hours at pod development phase also had significant positive correlation with pod yield. Regression models developed were able to account for 38% variation in pod yield in crop sown at onset of monsoon (D₁) and 85 to 92% variation in crop sown 15 days after onset of monsoon (D₂).

Key words : Correlation, groundnut, pod yield, regression model, weather parameters

Effect of planting methods and mulching on the thermal environment and biological productivity of groundnut*

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ABSTRACT

To estimate the altered thermal environmental effect due to adoption of planting methods and different mulches, a field experiment was conducted on groundnut at the CR Farm, BCKV, W. B., India in the summer seasons of 2003, 2004 and 2005. The experiment was laid out in a split-plot design, where the planting methods (flat and ridge) were the main plot treatments and the mulches (banana leaf with dry grass, water hyacinth, transparent polythene sheet, rice straw, jute stick and non-mulch control) were considered as the sub-plot treatments. The results showed that ridge planting method with use of water hyacinth or banana leaf with dry grass greatly altered the thermal environment by reducing air temperature, canopy temperature and SDDI in groundnut; both the dry matter production and yield of the crop were increased due to adoption of ridge planting and bio mulches due to conducive thermal environment. There existed a significant negative correlation between yield and air temperature, dry matter and air temperature, yield and canopy temperature, dry matter and canopy temperature yield and SDDI, dry matter and SDDI.

Key words : Air temperature, canopy temperature, dry matter, groundnut, stress degree day index (SDDI), thermal environment, yield

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Water use in chickpea (*Cicer arietinum* L.) in the Gangetic alluvial zone of West Bengal*

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ABSTRACT

A field experiment was conducted during the post-monsoon season for two consecutive years 2005-06 and 2006-07 to study the effect of date of sowing and irrigation regime on yield and water use in chickpea (*Cicer arietinum* L.). The results revealed that 1st date of sowing (20 November) recorded the maximum seed yield (1474.24 and 1442.58 kg ha⁻¹ during 1st and 2nd year, respectively) as well as plant height and dry matter accumulation. The daily moisture use rate of chickpea during early vegetative stage was slightly higher with earlier sowing as compared to that of late sowing in both the experimental years. But during reproductive stage i. e. after flowering, late sown crop recorded higher moisture use. But the overall consumptive use was higher under late sown condition. Application of two irrigations at branching and pod formation resulted in higher seed yield, whereas the consumptive use was higher when the irrigation was applied at branching and flower initiation. Total moisture use was lowest under rainfed condition that led to lower seed as well as biomass yield. However, the chance of rainfall (*Kal Baisakhi*) during March in the new alluvial zone of West Bengal must be taken into consideration while scheduling irrigation during pod formation.

Key words : Chickpea, date of sowing, irrigation, water use, yield

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Evaluation of different methods for evapotranspiration estimation using automatic weather station data*

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ABSTRACT

In the present study, six empirical models, namely, FAO-Penman-Monteith, Priestley-Taylor, Hargreaves-Temperature, Hargreaves-Radiation, Turc-Radiation and Makkink-Radiation were computed using Automatic Weather Station database. The AWS data were recorded at 3 min logging interval and 30 min averaging interval. The global short wave radiation recorded from AWS was used as input parameter for radiation based models like that of Turc, Hargreaves and Makkink and combined approach like that of FAO-Penman-Monteith and Priestley-Taylor. The empirically determined ET from all these models were validated with the pan derived ET, which was obtained from observatory records of pan evaporation and AWS records of RH and wind speed. From the overall analysis, it may be concluded that FAO-Penman-Monteith approach is most suitable for new alluvial zone of West Bengal where details database on temperature, humidity and radiation were available. However, in absence of humidity data Makkink approach may be recommended for empirical estimation of ET. On the other hand, when only temperature is available Hargreaves-Temperature model can give reasonable estimation of reference evapotranspiration.

Key words : AWS data, empirical model, evapotranspiration, pan evaporation

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Spectral characteristics of wheat as influenced by nitrogen stress*

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ABSTRACT

A field experiment was conducted during, *rabi* season of the year 2007-08 at Agronomy Farm, Anand Agricultural University, Anand, Gujarat to study the spectral characteristics of wheat (*Triticum aestivum* L.) as influenced by nitrogen stress and variety and to develop the relationship between spectral vegetation indices and growth and yield of wheat. Spectral observations at canopy level were taken between 10 : 30 to 11 : 30 A. M. by using spectroradiometer model Unispec-DC version 2.02 which operates in wavelength of 310-1100 nm covering visible and near infrared portion of the electromagnetic spectrum. The spectral reflectance data of wheat crop clearly demonstrated the differences in spectral reflectance characteristics at different stages of the crop growth. In the initial stage of the crop, the reflectances were found to be partially influenced by soils as the canopy had not fully developed. As the canopy developed, the reflectance increased in green and NIR region and decreased in red region. The spectral reflectances were higher in the treatment having higher N applications. The spectral indices viz., ratio vegetation index (RVI) and normalized difference vegetation index (NDVI) were lowest under no N and highest in 120 kg N. The correlation and regression analysis was carried out and is discussed.

Key words : Nitrogen stress, spectral reflectance, wheat

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Regression models for prediction of downy mildew progression in pearl millet var. HB 3 based on weather parameters*

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ABSTRACT

The downy mildew constitutes an important group of plant diseases affecting plant species. The data of 10 years (1991-2000) of downy mildew in pearl millet var. HB 3 recorded at the experimental field of CCS Haryana Agricultural University, Hisar were taken to develop the regression models for prediction of downy mildew progression in the crop based on weather parameters. Weather data for the same period (maximum, minimum and mean temperature, morning and evening relative humidity, sunshine hours, rainfall, rainy days, wind speed and rate of evaporation) were used for epidemiological study of downy mildew in pearl millet. Disease intensity values were transformed using Logistic, Gompertz, Monomolecular and Von Bertalanffy-Richard disease progression models. Growing degree days and vapour pressure deficit were computed using daily weather data. Disease intensity (%) and transformed values by different models were correlated with weather parameters. Among the disease progression models, disease intensity transformed by Logistic model showed the best association with weather parameters. Mean temperature, wind speed

and growing degree day were collectively explained upto 72% variability in downy mildew disease progression.

Key words : Downy mildew, pearl millet, regression models, weather parameters

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Effect of weather parameters on karnal bunt disease in wheat in Karnal region of Haryana*

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ABSTRACT

Data pertaining to average infection (%) of karnal bunt disease of wheat and meteorological parameters of 1st to 12th standard meteorological week (1st January to 25th March) for 25 crop seasons (1981-82 to 2004-05) of Karnal station were correlated to study the effect of weather parameters on Karnal bunt disease in wheat for most sensitive crop growth period corresponding to ear emergence and subsequent growth stages. The frequency of disease intensity and weather parameters indicated that when the maximum temperature exceeded normal accompanied by little or poor rainfall during 6 to 8th SMW, the disease intensity was low. Rainfall during the 3rd week of January showed strong relationship indicating favourable role in the formation and further multiplication of secondary spordia. However, during 9th SMW, maximum temperature, relative humidity, rainfall and sunshine duration showed considerably high correlations, whereas remaining parameters had weak correlation coefficients. Meteorological parameters during 6 to 12 SMW satisfactorily explained the occurrence of Karnal bunt disease with R^2 values of 0.84 that indicated only 16% variation of disease remained unaccounted.

Key words : Correlation, karnal bunt disease, meteorological parameters, wheat

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Population dynamics of safflower aphid, *Uroleucon compositae* (Theobald) as influenced by weather parameters*

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ABSTRACT

Field experiments were conducted during two consecutive *rabi* seasons of 2007-08 and 2008-09 at All India Co-ordinated Research Project on Safflower, Zonal Agricultural Research Station, Solapur, M. S. (India) with treatment comprising two varieties and the influencing abiotic factors viz., average minimum and maximum ambient temperature, relative humidity and rainfall. The results revealed that the safflower aphid (*Uroleucon compositae* Theob.) was active during 47th to 1st SMW on elongation and branching stages of safflower crop, but its appearance on crop totally depends upon prevailing climatic conditions. Low temperature and high humidity were conducive for the multiplication of this pest. Accordingly, aphid population attained a peak of 147.5 aphids/5 cm twig/plant in the 52nd SMW when the mean minimum and maximum temperatures, morning and evening relative humidity were 31.6°, 11.4°C, 71 and 28%, respectively. Thus, for the effective and efficient control of safflower aphid and producing higher seed yields, two sprayings of recommended 0.005% thiamethxam 25 WG or 0.004% acetamiprid 20 SP at ETL i. e. 40-45 DAS (46th to 47th SMW, min. temp. below 20°C) and second spray at 55-60 DAS (48th to 49th SMW, min. temp. around 15°C) are recommended particularly in the safflower growing scarcity zone of Maharashtra (India).

Key words : Population dynamics, *Uroleucon compositae*, weather parameters

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Impact of climatic factors on infestation of leaf eating caterpillar (*Mentrysia hyrtica*) of cashew in Chhattisgarh*

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ABSTRACT

A survey was conducted in randomly selected trees in adult cashew plantation of district Jagdalpur (C. G.) during 2003-04, 2004-05 and 2005-06. The infestation of leaf caterpillar was recorded and correlated with the corresponding weather parameters. The seasonal infestation of leaf eating caterpillar on cashew was recorded throughout the year. The infestation of this insect was found to vary from year to year. The climatic factors minimum temperature, relative humidity (evening) and rainfall positively influenced the variation in leaf caterpillar damages. The multiple regression analysis indicated that maximum temperature negatively contributed 27% towards incidence of leaf caterpillar damages.

Key words : Cashew, leaf caterpillar (LC), weather parameters

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Influence of weather factors on light trap catches of green leaf hopper at Pattambi, Kerala*

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ABSTRACT

In the present study, data of green leaf hopper for two species, namely, *Nephotettix nigropictus* (Nn) and *Nephotettix virescens* (Nv) have been used. First peak was observed for both the species during 38th to 41st standard meteorological week, the second peak was observed during 45th std. week and the third peak was observed during 52nd to 2nd std. week (i. e. from last week of December to 2nd week of January of the succeeding year) for all study years. Overall, around six overlapping generations of green leaf hopper appeared from March to November and were found most active during tillering to panicle initiation stages of the crop. The correlation studies between light trap net sweep collection with weather parameters on population build-up showed that lower minimum temperature, low rainfall and abundant sunshine had major impact on population build up of green leaf hopper for both the species.

Key words : Green leafhopper, population dynamics, weather parameters and photoperiods

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Impact of meteorological parameters on population dynamics of mango hopper in high rainfall zone of Konkan region*

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ABSTRACT

Mango hopper is the important serious pest of mango in all over parts of Konkan region causing loss to the extent of 60%. The population dynamics of mango hopper for four consecutive years (2005 to 2008) as well as the average population were correlated with the weather parameters like maximum and minimum temperature and afternoon relative humidity. The results revealed that all the three weather parameters viz., maximum temperature ($r=-0.525^*$), minimum temperature ($r=-0.561^{**}$) and afternoon relative humidity ($r=-0.556^*$) had a significant negative correlation with the average population of mango

hopper. Hopper population was started from 42nd Std. Meteorological Week (SMW) and attained peak value during 2nd MW and decreased thereafter upto 9th SMW.

Key words : Monophagous, population dynamics, weather parameters

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Calibration and validation of CERES-wheat model for wheat in middle Gujarat region*

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ABSTRACT

CERES (Crop Environment Resource Synthesis)-wheat model (DSSAT v 3.5-Decision Support System for Agrotechnology Transfer) was calibrated and validated for wheat cv. GW-496 at Anand using experimental data collected under different management practices (Date of sowing x Irrigation) during 1995-2007. Results showed that optimum sowing date (D_2 -15th Nov.) validation was found better as compared to early (D_1 -1st Nov.) and late (D_3 -30th Nov.) sowings. The validation of model for different irrigation regimes showed that the performance of model was poor in treatment having less irrigation (I_1 and I_2). The model performance was found good and satisfactory in treatments having 6-7 irrigations (I_3 and I_4). On an average, the performance of model for I_4 treatment was found good. This showed that model worked better under optimum sowing with optimum irrigation. The various test criteria for evaluation of model showed that highest correlation was observed in D_2I_3 treatment. The lowest MAE was observed in D_3I_3 treatment. Similarly, lowest MBE (12.77), lowest RMSE (46.04) and highest index of agreement (1.0) were observed in D_1I_4 treatment. The error per cent by CERES-wheat model showed that in majority of the cases the models had underestimated wheat yield. Per cent error ranged between -0.020 to -56.02. The average per cent error was found lowest in D_1I_4 , D_2I_4 and D_3I_3 irrigation treatments as compared to other treatments. This showed that the model worked good in all model test criteria. In a nutshell, the validation results showed that the model worked better under optimum sowing with optimum irrigation as compared to early/late sowing and moisture stress conditions.

Key words : CERES-wheat, DSSAT, simulation

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Validation of CERES-Maize model for growth, yield attributes and yield of kharif maize for NEPZ of eastern U. P.*

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ABSTRACT

The present study was conducted by using data from the experiment carried out at Crop Research Station, N. D. University of Agriculture & Technology, Bahaich (U. P.) during *kharif* 2006 and 2007. The experiment was conducted with three sowing dates in *kharif* season with one cultivar (HQPM-1). Sowing dates of experimental crop were 25 May, 15 June and 5 July. Genetic coefficients required for the CERES-Maize V 4.0 model for simulation of the growth, yield and yield attributes of maize crop have been derived for maize cultivar HQPM-1 for this agroclimatic zone. Simulated values obtained were validated against observed values of field experiment during *kharif* 2008. Results revealed that the simulated values of anthesis, physiological maturity, yield and yield attributes (like stalk, number of grains and test weight) were fairly well with measured values within the error percentage of 3.5, 6.5, 2.8, 23.8, 12.3 and 12.4%, respectively.

Key words : CERES-Maize model, growth, NEPZ, validation

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Evaluation of 'SOYGRO' model for soybean crop under Hisar conditions*

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ABSTRACT

Field experiment was carried out at Research Farm of Department of Agricultural Meteorology, CCS Haryana Agricultural University, Hisar located during *rabi* season of 2006 and 2007 on a sandy loam soil to study the evaluation of SOYGRO model of PK- 416 soybean cultivar for Hisar conditions. Yield attributes like pods per plant, number of seeds per pod and 100-seed weight decreased with subsequent delay in sowing from 7 June onward during both the seasons. Seed yield, straw yield and biological yield were highest in 7 June sowing as compared to late sown. The predicted deviation of seeds per pod was underestimated during both the crop seasons. This deviation varied from -4.47 to -8.95 seeds per pod in 2006 and -5.12 to -8.15 seeds per pod in 2007. The comparison of observed and simulated yield parameters viz., seed and straw yield showed that the model overestimated under all sowing dates. The straw yield was mostly overestimated but it was underestimated when crop sown delayed.

Key words : Observed and simulated, soybean, SOYGRO model, yield attributes

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Impact assessment of climatic variability on wheat and pearl millet productivity using CERES models in arid zone of Haryana*

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ABSTRACT

An investigation was conducted at Department of Agricultural Meteorology, CCS Haryana Agricultural University Hisar using meteorological data of 60 years (1941-2000) to study the climatic variability and trends in maximum and minimum temperature and rainfall. CERES models were used to determine the impact of future trend scenarios on productivity of wheat and pearl millet in arid zone of Haryana. Annual maximum and minimum temperature showed a decreasing trend during the past 60 years ($-0.31^{\circ}\text{C year}^{-1}$), but in last 30 years have shown an increasing trend ($.0087^{\circ}\text{C year}^{-1}$). Minimum temperature (annual and seasonal) showed both cooling and warming trend for a long period of 60 years, whereas maximum temperature showed a cooling trend during the same period. On the other hand, rainfall was observed with high coefficient of variability in post-monsoon and monsoon seasons. CERES models were calibrated for crop varieties, wheat (HD 2160) and pearl millet (HHB 67) and then validation was done with use of experimental data of wheat and pearl millet. CERES-Wheat model predicted yield with a variation of -7.3 to 15.3%, whereas CERES-Millet with a variation of -10.9 to 11.3% of the actual yield under different cooling and warming scenarios. Crop results indicated that warm temperature scenarios caused an adverse effect on growth and yield of wheat by hastening the physiological maturity. It was observed that flowering and

maturity of wheat and pearl millet crops were advanced and delayed from normal with rise and fall of temperature upto 2°C, respectively.

Key words : CERES model, climatic variability, pearl millet, temperature, wheat, yield

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Forecasting pearl millet productivity from the rainfall distribution of Rajkot district*

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ABSTRACT

With a view to find out the most suitable forecasting model for productivity of pearl millet by using past rainfall records of Rajkot district and to identify and quantify the effect of rainfall distribution, 47 consecutive years (1960 to 2006) weekly rainfall data from 23rd to 39th meteorological standard weeks (W), for the cropping season of the pearl millet were collected from Main Dry Farming Research Station, Targhdia (Rajkot). The time trend (T) was also included as an explanatory variable. The district yield of pearl millet (kg/ha) was considered as a response variable. The full model multiple linear regression equation explained 91% variation in pearl millet grain yield. For testing of this fitted model for future, six subsequent years (2001 to 2006) were not included for obtaining prediction equation and verified with actual yields of the district. The deviations between simulated forecasts and actual yields ranged from 2 to 20%. High deviations were due to irregular sowing period, erratic and uneven rainfall distribution of the district. Therefore, high standard error was observed in fitted model. However, this model could be considered for earliest (10 weeks after showing period) forecasting of pearl millet grain yield in Rajkot district.

Key words : Crop stages, forecasting model, multiple linear regression, pearl millet

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Short communication

Effect of agrometeorological parameters on incidence of downy mildew in pearl millet*

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Annual and seasonal rainfall variability at Dharwad, Karnataka*

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Short communication

Studies on leaf curl disease infection pressure and fruit yield of tomato as influenced by mulching and different meteorological variables*

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Short communication

Economic impact analysis of agro-advisory services during kharif season in central plain agroclimatic region of Punjab*

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