

## **Empirical relationship of sixth order to estimate global solar radiation from hours of sunshine**

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### **ABSTRACT**

A new set of constants based on sixth order polynomials fitting of measured data of sixteen Indian cities has been found to estimate the monthly mean global radiation on a horizontal surface. These constants provide good estimates of monthly mean global radiation on a horizontal surface with a maximum deviation of 8%. A comparison of the present result with the other models shows that the new constants yield more accurate results.

**Key words:** Monthly mean global solar radiation, Sunshine hours, Percentage estimation

## **Comparative evaluation of different methods to compute evapotranspiration at different phenological stages in wheat**

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### **ABSTRACT**

Evapotranspiration of wheat crop was estimated using different methods viz. lysimeter, USDA Open pan evaporimeter, empirical methods, combination approach and soil water evaporation model. The field experiment was conducted during *rabi* 2006-07 and 2007-08 with two weighing type lysimeters located at the research farm, Punjab Agricultural University, Ludhiana. Among different methods of ET estimation, Papadakis method computed highest rate of PET followed by Hamon and modified Penman method whereas modified soil evaporation model, Thornthwaite, Blaney-Criddle and Stephans & Stewart methods produced lower values of PET as compared to lysimeter ET and open pan evaporation. Modified Jensen & Haise method estimated PET values (346 and 361 mm) closest to lysimeter ET (340 and 341 mm) and open pan evaporation (360 and 432 mm) respectively, for two seasons. PET computed by Blaney-Criddle method showed very good correlation with Lysimeter ET (0.90).

**Key words:** Evapotranspiration, wheat, vapour pressure deficit, lysimeter, empirical methods, crop coefficient

## **Quantitative assessment of influence of monsoon rainfall variability on rice production over India**

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### **ABSTRACT**

An attempt has been made to study the influence of onset of monsoon and also that of rainfall variability and its distribution during the monsoon months on rice production over India. The main rice-growing season in the country is the "Kharif" and 84 % of the country's rice crop is grown in this season. Mean monsoon rainfall over India as a whole during June-September is 840 mm with a coefficient of

variation of 10 per cent and this amounts to about 85 per cent of the annual precipitation (1081 mm). The regressions between Normalized Yield Index and the Normalized Monthly Rainfall Indices during the monsoon months show that rainfall in July and September are most significant to rice yield variability. The multiple regression of Normalized Yield Index with Normalized rainfall indices of June to September months as well as the Normalized Monsoon Rainfall Index showed the same multiple correlation coefficient and was significant (R=67) at 0.01 level.

**Keywords:** Rainfall variability, Normalized yield index, Rainfed, Multiple regression, Technological trend.

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## **Effect of inter- and intra-seasonal variations in meteorological parameters on wheat yields in Punjab**

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### **ABSTRACT**

A study was conducted to evaluate the effect of variations in meteorological parameters on wheat (*Triticum aestivum* L. emend. Flori & Paol) yields during 1970-2005 and also as simulated with CERES-wheat model. The technology trend model of historical wheat yields in Punjab indicated that over the past 2 to 3 decades, at Ballawal Saunkhri, Amritsar, Ludhiana, Patiala and Bathinda the wheat yields have increased @ 64.2, 76.3, 62.8, 87.3 and 71.1 kg/ha/year respectively. An analysis of historical meteorological data and past wheat yields revealed that for January, February and March the most favourable maximum temperatures for wheat yields were in the range of 16.1-18.0 °C,  $\leq 21.0$  °C and 28.1-30.0 °C respectively while minimum temperatures were in the range of 3.1-5.0 °C, 5.1-7.0 °C and 11.1-13.0 °C respectively. The simulation study using CERES-wheat model revealed that the temperature increase mostly affected the early (October) sown crop during fourth week of January up to first fortnight of March; the timely (November) sown crop during February and March; the late (fourth week of November) sown crop during March; and very late (December) sown crop during March and first week of April. An analysis of historical wheat yields and weekly meteorological parameters at Ludhiana revealed that during the high yield (>5 000 kg/ha) crop years, the maximum and minimum temperatures remained near normal ( $\pm 2^\circ\text{C}$ ); the rainfall was also normal or slightly above/below normal under assured irrigated conditions. From mid-February to March, dry and clear weather proves beneficial for grain filling in wheat. On the other hand, during low yield (<4 600 kg/ha) crop years, although the temperatures were favourable but very heavy rainfall showers were received during the anthesis and grain-filling period of wheat crop. The weather also remained cloudy and sunshine hours were invariably below or near normal while the relative humidity remained above (3-10 %) or near normal during most part of the crop season. Hence, these conditions were ascertained to be the most pertinent reason for relatively low-wheat yields.

**Key words:** Temperature, rainfall, relative humidity, sunshine, wheat yield, technology trend model

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## **Impact of climate change on agriculture in Karnataka**

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### **ABSTRACT**

Karnataka state is having the second largest rainfed agricultural area in the Country and food production is mainly depending on the south-west monsoon. The State's mean annual rainfall is found to be in decreasing trend along with its sixteen years cyclic periodicity. The State first half century's (1901-1950) normal of 1204 mm has been reduced to 1140 mm during second half of the century (1951-2000). Nevertheless, few districts like Bengaluru, Kolar and Tumkur are gaining in their mean annual rainfall and some traditionally heavy rainfall receiving districts like Kodagu, Chikmagalur and South Canara are losing in their mean annual rainfall. The eastern districts of the state are tending to be more dependent on North East monsoon than terminal rains of the South West monsoon. Consequently individual crop growing area, growing period are changing. The normal sowing season rains are being delayed due to the shift of July rains to the August month and September peak rainfall is being shifted to October month. The maximum water available period for the grand growth period is shifting towards the end of September and beginning of October in many districts. Finger millet crop area (main food crop of southern Karnataka) in Chikmagalur district, Groundnut area in Chitradurga and Tumkur districts, Red gram in Bidar and Gulbarga districts is increasing. Where as, Groundnut area in Belgaum and Gulbarga districts and Red gram area in Belgaum and Tumkur is decreasing.

**Key words:** Climate change, rainfall, productivity, global warming

## **Assessing the climate based productivity potential of soybean in Madhya Pradesh**

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### **ABSTARCT**

Present study was undertaken to study the effect of rainfall on soybean productivity in three districts of Madhya Pradesh. The secondary data were collected related to area, production and productivity of soybean. The present study revealed that Jabalpur and Indore showed increasing trend in productivity until mid nineties and there after it started declining whereas at Chhindwara declining trend in productivity of soybean. But normalized yield at Chhindwara showed no change. However, a plot of normalized yield with normalized rainfall of these districts shows that there was an increased in yield with increased rainfall at Indore and Chhindwara, but yield declined with increased rainfall at Jabalpur.

**Key words:** Soybean, rainfall, productivity, normal, yield trend

## **Radiant energy distribution in guava (*Psidium guajava* L.) plants at different spacings**

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### **ABSTRACT**

The study on radiant energy distribution in guava was carried out to optimize the planting density with respect to solar radiation interception by the plants to get higher yield of good quality fruits per unit area. The present investigations reveals that with increase in plant spacing from 6x2m to 6x4m the interception of radiation increased significantly during both rainy and winter crop seasons. However, it starts declining with further increase in plant spacing to 6x5m level. The interception of radiation remains somewhat static during the summer and rainy season months (May-September) and then starts decreasing with the advent of winter season upto April with sharp decline during the month of December to February. In the upper 1/3<sup>rd</sup> portion of plant canopy, more than 75% radiations were intercepted irrespective of plant spacing followed by 12-16% in middle and 6-9% in the lower 1/3<sup>rd</sup> parts of plant canopies. The plant spacing of 6x2m and 6x3m was found to be not encouraging owing to lower distribution of radiations particularly in middle and lower parts of plants. The plant spacing of 6x4m was found to be best due to maximum absorption of solar radiation for higher fruiting of better quality fruits.

**Key words:** Guava, solar radiations, plant canopy

## **Light interception and radiation use efficiency of wheat varieties as influenced by number of irrigations**

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### ABSTRACT

An experiment was conducted during *rabi* seasons of 2002-03 and 2003-04 to quantify the light interception and radiation use efficiency for three wheat varieties as affected by variable number of irrigations with the combination of three wheat varieties viz., HUW-234, HD-2285 and PBW-154. The light interception increased successively till 90 days after sowing (DAS) and thereafter a gradual decrease was observed till maturity of the crop. Four irrigations given at CRI, late tillering, late jointing and ear head formation stages showed highest radiation interception followed by three and two irrigations, however, the lowest radiation interception was observed for wheat crop receiving one irrigation only. On an average, 19.08 % and 12.79 % increase in radiation interception was found for wheat crop irrigated four and three times respectively as compared to singly irrigated crop. Highest radiation interception was recorded with HUW 234 followed by HD 2285 at all the growth stages except 15, 30, 45 DAS. More light interception reflected in significantly superior yield and yield attributes in the order of  $I_4 > I_3 > I_2 > I_1$ . Subsequently, radiation use efficiency (RUE) also followed the similar trend showing highest and lowest RUE with four and one irrigation respectively. Among the different varieties, HUW-234 recorded highest radiation use efficiency followed by HD-2285. The average RUE during the entire growing period for HUW-234 and HD-2285 was found to be 1.68 g MJ<sup>-1</sup> and 1.63 g MJ<sup>-1</sup> respectively, which was 4.83 and 1.95 % higher than PBW-154.

**Key words:** Light interception, radiation use efficiency, wheat, irrigation

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## Determination of crop evapotranspiration of tea (*Thea sinensis*) using weighing lysimeter for the Nilgiris

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### ABSTRACT

A long term experiment (1996-2001) was conducted for determining crop evapotranspiration (ET<sub>c</sub>) of tea (*Thea sinensis*) using weighing type lysimeter at the Central Soil and Water Conservation Research and Training Institute-Research Centre (CSWCRTI-RC), Research Farm, Udhagamandalam, Tamil Nadu, India. Based on the weekly average crop evapotranspiration for the entire period of observation, the different growth stages were observed and classified as initial season, mid season and late season for increasing growth rate, constant growth rate and declining growth rate, respectively. The average crop evapotranspiration for the corresponding s was 2.77, 3.31 and 2.27 mm/day, respectively. The maximum ET<sub>c</sub> was observed during mid season followed by initial and late seasons.

**Key words:** Evapotranspiration, tea, and lysimeter

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## Seedling establishment of chickpea cultivars in varying sowing environments under field conditions

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### ABSTRACT

Quantitative information about sowing time and soil temperature on seedling emergence in chickpea (*Cicer arietinum* L.) is scarce. Therefore, fifteen cultivars of chickpea were evaluated CCS Haryana Agricultural University, Hisar for cumulative seedling establishment based on per cent germination and

thermo tolerance index (TI) i.e; ratio of seedlings surviving to total number of seedlings emerged during rabi seasons of 2004 and 2005 under field conditions. The TI value was constantly higher in Pusa 256 cultivar in all the experiments. The TI values ranged between 0.85 to 1.00 in Experiment 1, 0.84 to 1.00 in Experiment 2, 0.88 to 1.00 in Experiment 3, 0.84 to 1.00 in Experiment 4, 0.84 to 0.94 in Experiment 5 and 0.72 to 0.94 in Experiment 6. In general, the early sown (October) cultivars recorded higher rate of seedling emergence than the cultivars late sown (November). The results suggest that poor stand/seeding establishment of some chickpea cultivars might be due to lower initial seeding emergence rather than subsequent seedling survival and the importance of environmental conditions before emergence.

**Key words:** Seedling survival, chickpea, optimum environment, thermo-tolerance index, thermal requirement.

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## **Estimation of cotton yield based on weather parameters of Junagadh district in Gujarat state**

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### **ABSTRACT**

The study was carried out to find the quantitative relationship between weather parameters and district level yield of cotton. For this purpose 32 years weather and crop yield records of Junagadh district (India) were collected. A twenty six week crop period model was recommended for pre harvest forecast due to higher R<sup>2</sup> value and lower simulated forecast deviation. The time trend, maximum temperature, morning and evening relative humidity significantly affected crop yield.

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

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## **Growth and yield prediction in mustard using InfoCrop simulation model**

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### **ABSTRACT**

The present study was conducted to calibrate and predict the growth and yield of *Brassica juncea* under semi-arid environment of Delhi region using InfoCrop model. Field experiments were carried out with the variety Pusa Jaikisan (most popularly grown in north western parts of India), sown on 15<sup>th</sup> and 30<sup>th</sup> October of *rabi*, 2005-06 and 2006-07 on sandy clay loam textured soils at research farm of Indian Agricultural Research Institute (IARI), New Delhi. The base temperature at different phenological stages was taken as 5°C. The thermal time from germination to flowering was calibrated to 730<sup>o</sup>D. Crop growth parameters like leaf area index (LAI), biomass and seed yield were simulated using InfoCrop model. The model overestimated LAI and biomass at the initial crop growth stages but underestimated at the peak/maximum level. The model overestimated the seed yield for both the sowings and the seasons. Actual seed yield was of the order of 23 to 37 q ha<sup>-1</sup> while the simulated yield was of the order of 37 to 42 q ha<sup>-1</sup> with a RMSE value of 3.14 indicating significant differences between observed and simulated yield. The model needs further refinement.

**Key Words:** *Brassica juncea*, biomass, leaf area index, seed yield, InfoCrop

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## **Yield prediction model of rice in Bulsar district of Gujarat**

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## ABSTRACT

Efforts were made for utilization of ICT to develop suitable agrometeorological model for rice yield prediction in Bulsar district of Gujarat. Six weather variables viz. bright sunshine hours ( $X_1$ ), rainfall ( $X_2$ ), maximum temperature ( $X_3$ ), minimum temperature ( $X_4$ ), morning relative humidity ( $X_5$ ) and afternoon relative humidity ( $X_6$ ) were analyzed for the crop weather relationship to develop regression models. Five approaches were used for fitting of the models i.e. week wise, stage wise, period wise, week number as weight and correlation coefficient as weight.

The sowing of rice is mainly concentrated around the second week of June in Gujarat. Hence, the data pertaining to weather parameters for the period 23<sup>rd</sup> to 42<sup>nd</sup> meteorological standard weeks (MSW) were included in the present investigation. Four out of the five approaches, which were used for fitting the models, models fitted with stage wise, period wise, week number as weight and correlation coefficient as weight approaches could not be identified as acceptable models. Only one, 18 week model fitted with week wise approach which provided earlier rice yield prediction (2 weeks before harvest) and explained higher variation in rice yield (Adjusted  $R^2 = 99.8\%$ ) is preferred.

**Keywords:** Rice productivity, agrometeorological model, stepwise regression, weather parameters

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## Incidence of cotton bollworm (*Helicoverpa armigera* Hibner) in relation to meteorological parameters in the saline zone of West Bengal

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### ABSTRACT

To study the relationship between weather parameters and the population of *Helicoverpa armigera*, cotton (cv. LRA- 5166) was grown during January, 2001 at Metakara, 24pgs, W.B. on an area of 500 m<sup>2</sup>, by adopting full package of practices recommended for the crop in W.B. condition. Result revealed that the *H. armigera* population has significantly negative correlation with maximum temperature (Max-T,  $r = -0.78$ ) and significantly positive correlation with afternoon relative humidity (Min-RH,  $r = 0.80$ ). Result revealed that 30.5 to 32.5 °C Max-T coupled with 65 to 77 % Afternoon-RH caused heavy infestation of the insect in cotton crop.

**Key words:** Cotton bollworm, temperature and relative humidity

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## Effect of weather parameters on population dynamics of green leaf hopper and white backed plant hopper in paddy grown in middle Gujarat region

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### ABSTRACT

*Nephotettix virescens* Distant and *Sogatella furcifera* (Horv) commonly known as Green leaf hopper (GLH) and White backed plant hopper (WBPH) respectively. These are the serious pests of *kharif* paddy all over the world causing extensive losses. The population dynamics of Green leaf hopper and white backed plant hopper for ten consecutive years (1994 to 2004) except for 1997 were correlated with the weather parameters like maximum and minimum temperature, rainfall, relative humidity and bright sunshine hours. The results revealed that the bright sunshine hours had a positive significant correlation ( $r=0.166$ ) with the population dynamics of GLH. The correlation between WBPH peak population and bright sunshine hours also showed positive significant correlation ( $r=0.269$ ), while maximum temperature, minimum temperature, rainfall and relative humidity showed non-significant effect on population build up of both GLH and WBPH. Green leaf hopper attained peak population during 43<sup>rd</sup> standard

meteorological week; whereas white backed plant hopper reached peak population during 39<sup>th</sup> standard meteorological week and decreased considerably thereafter.

**Key words:** Polyphagous, photoperiodism, population dynamics, and weather parameters

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## **Studies on seasonal activity of white fly (*Bemisia tabaci* genn.) population and its association with weather parameters in Bundelkhand zone of Madhya Pradesh**

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### **ABSTRACT**

An experiment was conducted during ten consecutive *kharif* seasons from 1995 to 2004 at Zonal Agricultural Research Station, Tikamgarh to study the seasonal activity of white fly and its association with weather parameters in sesame crop (cv JT-7). The analysis revealed that the activity of the pest started from 30<sup>th</sup> standard meteorological week and remained up to 39<sup>th</sup> SMW. The highest population was recorded during 37<sup>th</sup> SMW. White fly population was correlated with weather data. Correlation coefficient and regression equations were worked out for development of weather based prediction model. White fly population was observed to have significantly positive correlation with minimum temperature and rainfall and negative correlation with maximum temperature. The multiple regression technique was used for developing predictive model using white fly population and weather data not only for the corresponding week but also for preceding weeks. The equation explains more than the 98 percent pest population variation.

**Key words:** White fly, sesame, temperature, rainfall, correlation, regression model

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## **Population dynamics of different pests on Bt-cotton vis –a –vis meteorological parameters in Punjab**

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### **ABSTRACT**

The incidence of Jassid, whitefly and tobacco caterpillar was recorded from the South-Western districts of Punjab i.e. Muktsar, Faridkot and Ferozepur during cotton season in 2007. Correlation coefficients were calculated between number of whitefly, jassid, tobacco caterpillar and meteorological parameters. The incidence of jassid and tobacco caterpillar was low as compared to whitefly in all the districts. All the meteorological factors contribute in determining the incidence of different pests, but rainfall has definitely negative impact on the jassid and whitefly population.

**Key words:** Bt-cotton, pests population, weather parameters.

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## **Crop calendar with the use of meteorological data in Tripura**

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### **ABSTRACT**

The meteorological data recorded during the period from 1992 to 2006 were used for preparing crop calendar in Tripura. Maximum and minimum temperatures in the state varying from 22.4 to 35.6°C and 9.3

to 26.1°C, respectively. The crops, rice, maize, oil seeds, pulses, vegetables, mushrooms, tuber crops, fibre crops and fruits were considered in this calendar. Growing seasons for different kinds of mushrooms were determined for better productivity.

**Key words:** Crop calendar, cereals, pulses, mushrooms.

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## **Rainfall probability modeling for Neelambur areas of Coimbatore, Tamil Nadu**

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### **ABSTRACT**

Daily rainfall data obtained from the rain gauge station, Sulur (11° N and 77° E) were analyzed for fitting one day maximum rainfall, average weekly, monthly and seasonal rainfall data, using different distributions like Normal, Log-normal, Gumbel and Log-Pearson III to determine the best fit distribution. Over the study area, the Gumbel and Normal distribution distributions are identified for the estimation of one day maximum rainfall, the average weekly and monthly rainfall with minimum D-index. However for seasonal rainfall, all four distribution viz., Gumbel, Log-normal, Log-Pearson III and Normal distributions gave relatively low D-index values with minimum in Gumbel distribution.

**Key words:** Probability density function, D-Index

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## **Rainfall based crop planning in the Barak Valley zone of Assam**

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### **ABSTRACT**

Daily rainfall data for 47 years (1960-2006) of Karimganj, Assam were analysed. The overall mean annual rainfall was 4073.5 mm, which was distributed as 2613.6 mm, 1134.8 mm and 330.3 mm in *kharif* (June to September), summer (March to May) and *rabi* (October to February) seasons, respectively. The probability of 60 and 100 mm rainfall per week exceeds 70 per cent values between 18<sup>th</sup> to 37<sup>th</sup> and 22<sup>nd</sup> to 30<sup>th</sup> week, respectively. In flood free upland and medium land areas transplanting of *ahu* rice is suggested to complete within first week of April and the second crop of rice (*sali*) could be transplanted from 31<sup>st</sup> week onwards. In upland area, sowing of toria/potato/vegetables may be started from 43<sup>rd</sup> week onwards. In areas where the second crop of rice is not possible due to flood, the *ahu* rice should be followed by potato/toria/pulses/vegetables etc from 43<sup>rd</sup> week onwards.

**Key words:** Rainfall, rainy days, rainfall probability, crop planning

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## **Rainfall and temperature trend analysis in the red and lateritic zone of West Bengal**

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## ABSTRACT

Due to inherent problems of water holding capacity of soil in the red and lateritic zone, the trend of climate change was assessed. Twenty rain gauge stations covering three districts (namely Bankura, Birbhum and Purulia) in the zone were considered to study the rainfall pattern. An increasing trend of yearly rainfall and shifting pattern of rainfall were observed in the said zone as a whole. The rainfall during May decreased in most of the selected stations, where as in October the rainfall amount increased in 75 % cases and in November it increased in 95 % cases. Analysis of maximum temperature data shows that average monthly temperature of summer months (April – May) of 1990-2000 decreased marginally compared to that of 1970-80. The minimum temperature of the zone, as a whole shows an increasing trend.

**Key words :** Rainfall, temperature, trend analysis

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### **Short communication**

## **Impact of imposed climate variation on rice productivity in Baroda district of Gujarat**

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### **Short Communication**

## **Effect of sowing date on some growth characters in linseed**

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### **Short communication**

## **Some preliminary observations on varietal influences on yield components of rice.**

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