Evapotranspiration paradox at a semi-arid location in India
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ABSTRACT
Paradox of decreasing evaporation and evapotranspiration under increasing temperature conditions in the semi-arid tropics assumes greater importance as agriculture in these areas is more vulnerable to climate change. Trends in annual reference crop evapotranspiration (ET\textsubscript{o}) at Patancheru, Andhra Pradesh indicated a reduction of about 200 mm from 1850 mm to 1650 mm during the past 35 years. Contribution of energy balance term to the total ET\textsubscript{o} has shown an increasing trend while aerodynamic term has a decreasing trend. Wind speed has shown a strong negative trend leading to the dramatic fall of the aerodynamic term and consequently the ET\textsubscript{o}. Rate of reduction in evapotranspiration demand was about 10\% for kharif (Jun-Oct) and about 14\% for rabi (Nov-Feb). At Patancheru, measured temperature and solar radiation showed opposite trends and at locations where no measured solar radiation data available and if solar radiation is estimated from air temperature alone for use as an input in crop modelling, outputs under such conditions need to be interpreted with caution. Present study highlights the need for climate change impact studies at a local level in addition to those based on regional and global circulation models.

Key-words: Reference crop evapotranspiration, semi-arid tropics, trends, watersheds

Estimating wheat productivity for north western plain zone of India in relation to spatial-thermal variation
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ABSTRACT
The study aimed at quantifying the interaction of exposure of wheat to high thermal stress for a specific duration during the reproductive stage with yield over north western plain zones of India. Thermal stress duration of at least of continuous five days, where average daily temperature positively depart by ≥ 2 °C above long term normal were correlated with annual wheat yield, for two phenological stages, viz. late vegetative and reproductive, under the most ideal location, i.e. Ludhiana, and were extended to estimate yield in other locations through introduction of a thermal response factor. In the reproductive stage a 10 per cent reduction from the average yield was expected in 10 days of thermal stress for Hisar, 13 days for Karnal and 15 days for Kanpur if exposed to average stress temperature departure of above normal (4.20, 3.63 and 3.54 °C, respectively). Findings suggested that the locations with relatively cooler thermal regimes experience proportionately higher yield loss compared to relatively warmer places for same amount of thermal stress exposure. Besides, achievable wheat production in India may be limited by 1.170 to 2.392 million tonnes every year, if climate change scenarios are taken in to consideration. This simple procedure may be useful in estimating wheat yield in relation to spatially variable atmospheric thermal regime in spite of complexities and uncertainties involved in actual farm productions.

Key words: Climate change, response factor, thermal stress, variability, wheat

Climate change impact on crop water requirements in arid Rajasthan
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ABSTRACT

The impact of projected climate change by 21st century on water requirements of rainfed monsoon and irrigated winter crops of arid Rajasthan has been studied. Crop water requirements were estimated from daily potential evapotranspiration at ambient and projected air temperature by 2020, 2050, 2080 and 2100 using modified Penman-Monteith equation and then by multiplying with crop coefficients. Crop water requirements in the region varied from 308 to 411 mm for pearl millet, 244 to 332 mm for clusterbean, 217 to 296 mm for green gram, 189 to 260 mm for moth bean, 173 to 288 mm for wheat and 209 to 343 mm for mustard. Further, due to global warming, if the projected temperatures rises by 4°C, by the end of 21st century, water requirement in arid Rajasthan increases from the current level, by 12.9% for pearl millet and clusterbean, 12.8% for green gram, 13.2% for moth bean, 17.1% for wheat and 19.9% for mustard. The increased crop water requirements in the region, resulted in reduction in crop growing period by 5 days for long duration crops, but the crop acreage where rainfall satisfies crop water requirements, reduced by 23.3% in pearl millet, 15.2% in clusterbean, 6.7% in green gram, 13% in moth bean. The study reveals that the impact will be more severe on rabi crops than kharif crops, the rabi crops being dependent on depleting ground water resources in the region.

Key words: Climate change, elevated air temperatures, crop water requirement, Indian arid region


Modelling diurnal pattern of relative humidity from daily air temperature and relative humidity data of Hyderabad

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ABSTRACT

This study presents a simple methodology to estimate diurnal patterns in dew point temperature/relative humidity on weekly basis from mean minimum temperature or the morning relative humidity under semi-arid climatic conditions of Hyderabad. The sinusoidal and exponential models for day time and night time temperature pattern have been utilized in working out the diurnal patterns of the relative humidity on weekly basis at Hyderabad. Diurnal variation in dew point has been found to have, by and large, a set pattern depending upon the morning dew point temperature. Diurnal relative humidity patterns have been worked out both from the estimated dew point/relative humidity and the actual recorded relative humidity. This model is expected to be quite useful for long term retrospective agro-climatological studies wherein daily relative humidity and/or diurnal patterns thereof are required as input.

Key Words: Diurnal modelling, dew point temperature, relative humidity

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Nakshatra based rainfall variability, trends and its influence on rice-wheat production - A case study over two sites in Bihar, India

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ABSTRACT

An attempt has been made to study the variability and trends of rainfall during nakshatra periods for two sites, Patna and Samastipur of Bihar and verified the relation of four traditional knowledge/ proverbs/beliefs of nakshatra based rainfall pattern, which are popular in this part of the region with rice-wheat productivity. Maximum rainfall and highest rainy days occurred during punarvasu nakshatra (July 6 – July 19) over both sites followed by pushya (July 20- Aug 2). The coefficient of variation of rainfall shows below 100 % from aridhra (June 22 – July 5) to uttara (Sept 13-26) at Patna and from rohini to pubhha (Aug 31- Sept 12) for Samastipur. A significant increasing trend of 0.965 mm y\(^{-1}\) and decreasing trend of -0.857 mm y\(^{-1}\), respectively have been noticed during pubhha and hasta at Patna. However, a significant increasing trend of 1.536 mm y\(^{-1}\) and decreasing trend of -0.774 mm y\(^{-1}\), respectively have been noticed during aridhra and hasta at Samastipur.

Keywords: Nakshatra, Rainfall variability, Mann-Kendall non-parametric test, Productivity index, Rainfall anomaly index, Correlation

Effect of weather parameters on pest-disease of okra during summer season in middle Gujarat

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ABSTRACT

To assess the impact of weather on pest-disease of okra, a field experiment was conducted in summer season 2009 in split plot design with five dates of sowing (D\(_1\) -15\(^{th}\) February, D\(_2\) -1\(^{st}\) March, D\(_3\) -15\(^{th}\) March, D\(_4\) -1\(^{st}\) April and D\(_5\) -15\(^{th}\) April) and two spraying levels (S\(_0\) -control, S\(_1\) -spraying) at Agronomy Farm of B.A. College of Agriculture, Anand Agricultural University, Anand. The results revealed that the infestation of pests and diseases was higher in delayed sowing as compared to early sowing resulting reduction in yield by 44.4%. Different weather parameters were found to have different effect on various pests and diseases. The correlation study revealed that the Tmax had significant influence on jassid population while relative humidity had significant influence on aphid population. The whitefly, percent fruit damage and YVMV disease were significantly influenced by most of the parameters. However, bright sunshine hours (BSS) and pan evaporation (EP) did not have significant influence on any of the pests and disease of okra. Linear simple regression models, multiple regression models and curvilinear regression models developed with various weather parameters. Among all models, the curvilinear regression model using GDD was found well fitted in order to explaining the maximum extent of variability (83\(^{**}\) to 98\(^{***}\)%) in the population and intensity of most of the pests and disease except whitefly which was well explained by linear regression developed with VPmean (R\(^2\) 0.88\(^{**}\)).

Key words: Weather, okra, pest, disease
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ABSTRACT

A field experiment was carried out during kharif seasons of 2005 and 2006 to study the effect of heat and thermal unit use of maize cultivars in red sandy loam soil at Zonal Agricultural Research Station, Shimoga (Karnataka, India). The experiment consisted of three dates of sowing viz., first fortnight of June, second fortnight of June and first fortnight of July with six cultivars viz., two double cross hybrids (Allrounder and 30 R-77), two single cross hybrids (NAH-2049 and 30 V-92) and two composites (NAC-6004 and NAC-6002) was laid out in split-plot design replicated thrice. Higher heat use efficiency was recorded with the crop sown in first fortnight of June and decreased with each delay in sowing. Grain yield of maize was found inversely related to the helio-thermal units. Thus, early sowings escape adverse situation during its life cycle in maize.

Key words: GDD, heat use efficiency, helio-thermal units, maize


Thermal time requirements for phenophases of apple genotypes in Kullu valley

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ABSTRACT

A field experiment was conducted at Horticultural Research Station, Seobag (Kullu) from 2004 to 2010. The phenology of ten apple cultivars was observed on every second day on three plants of each cultivar with three replications from bud-bust, green-tip, pink-bud, full-bloom to physiological maturity. GDD, HTU, PTU, HYTU and heat use efficiency was computed from the meteorological data recorded from observatory and averaged of for ten years. Tydeman, commercial and Mollice has taken lower GDD for the physiological maturity but higher for attaining petal-fall. On an average apple required 330 GDD from bud bust to petal fall with 4°C as base temperature. Cultivars completing the rest period earlier used more thermal units and giving good fruit yields as compare to those breaking their dormancy later. Thermal units explain more than 75-99 % variation in fruit yield. Higher thermal use efficiency was observed for Starking Delicious and Vance Delicious followed by Top Red and Tydeman which may be encouraged among the growers.

Key words: Phenophases GDD, HTU, PTU, HYTU and apple genotype.

Physico-chemical properties of guava fruits as influenced by solar radiation penetration in plants canopies

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ABSTRACT

The study was conducted to observe the solar radiation distribution in different parts of 7-year-old guava plants and its subsequent effect on fruit quality. The interception of solar radiation decreased markedly with the depth of plant canopy from top to bottom as well as with increase in plant density. More than 3/4th of incoming radiations were found to be intercepted by upper one meter periphery of guava plants irrespective of plant spacing. The fruit quality in terms of size, weight, TSS, vitamin C and overall palatability reduced significantly with the depth of plant canopy and decrease in plant spacing. The upper canopy fruits particularly of widely spaced plants were better than others. Winter season fruits were double in weight and more palatable as compared to rainy season fruits.

Key words: Guava, fruit size, solar radiations, quality.

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Weather modification for off-season production of coriander (Coriandrum sativum L.) for leaf

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ABSTRACT

Coriander is produced almost throughout the year for leaf purpose, however the demand for leaf during summer is high. The present investigation is undertaken to study the weather modifications and their influence on production of coriander for leaf purpose during summer. Nine different production systems and their effect on micro-climate were studied. The study indicated that among the various weather factors studied, soil temperatures significantly influenced the germination, crop growth and yield. Soil temperature was significantly negatively correlated with number of leaves, leaf length, green biomass, shoot weight, leaf weight and yield. The mean afternoon (both ambient and soil) temperatures were also significantly negatively correlated with above growth parameters. The overall results of the experiment suggest that the soil temperatures are the most crucial factor in summer production of coriander. The afternoon soil temperature if ameliorated and maintained between 28.0°C to 32.5°C, coriander production can be taken up successfully without any modification of other weather factors like air temperature and relative humidity. However, amelioration in ambient air temperature further improves the efficiency of the production system.

Key words: Coriander, off-season production, temperature and relative humidity.


Short communication

Estimation of crop water requirement based on Penman-Monteith approach under micro-irrigation system

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Short Communication
Detection of heat wave trends in semi-arid climate of Udaipur, Rajasthan

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Short Communication
Verification of medium range rainfall forecast under south Saurashtra agro climatic zone, Gujarat

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Short Communication
Analysis of meteorological drought at New Delhi using SPI

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Short Communication
Seasonal changes in soil temperature within mustard crop stand

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Short Communication
Effect of weather variability on crop growth and aphid infestation in Mustard crop

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Short Communications
Long term variability and trends of temperatures over various time-scales at Pusa, Bihar

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