

THESIS ABSTRACTS
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Agricultural Meteorology

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VASANTRAO NAIK MARATHWADA KRISHI
VIDYAPEETH, PARBHANI

Title	-	Phenological studies on Sesamum [<i>Sesamum indicum L.</i>] varieties under varied weather condition
Researcher	-	Sawant, Dhanaji Mohan
Research Guide	-	Alse, U.N.
Department	-	Agricultural Meteorology
Subject	-	Agricultural Meteorology
Degree	-	M.Sc
Thesis No.	-	17102
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033718
Abstract	-	

An experiment was conducted on experimental farm of Department of Agricultural Meteorology, College of Agriculture, Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani, during *kharif* season 2016 entitled “Phenological studies on Sesamum [*Sesamum indicum L.*] varieties under varied weather condition” to find out most optimum meteorological week for sowing sesamum in *kharif* season and effect of weather parameter on sesamum growth and yield, to study the relationship between meteorological parameters and yield.

An experiment was conducted in split plot design with three replications. Treatment under study were four sowing dates in *kharif* season i.e. D₁ (27th MW), D₂ (28th MW), D₃ (29th MW) and D₄ (30th MW), and four different varieties Phuletil -1, Gujarat - 2, JLT - 408 and JLT - 7 were sown with spacing 45x15 cm. The gross plot size was 5.4 x 4.0 m² and net plot size was 4.5x3.6 m². The sowing of seed was done by dibbling method on respective date of sowing. The meteorological parameters (abiotic factor) play an important role in deciding the success or failure of the crop, because these factors strongly influence the physiological expression of genetic potential of the crops, hence this study was undertaken. The results obtained from the experiment it was found that all the biometric observations (plant height, number of leaves, number of branches, leaf area and leaf area index) in *kharif* sesamum were significantly highest in sowing D₂ 28 MW (09 to 15 July) followed by first sowing date D₁ i.e. 27 MW (02 to 08 July). Sowing at D₂ (28 MW) found superior over the rest of treatments with production of highest grain yield 226.55 kg ha⁻¹ followed by sowing in first sowing date D₁ 173.71 kg ha⁻¹ and lowest

grain yield was observed in fourth sowing D₄ (30 MW). Hence, sowing of *khari*sesamum should be completed in 28 MW. Correlation between weather parameters and growth stages of sesamum with grain yield showed that the weather parameters like rainfall, temperature, relative humidity and wind speed are significant effect on critical growth stages. Rainfall have a positive influence on the grain yield of *Khari*sesamum. Diurnal temperature range also showed significant influence on grain yield and as the range increase yields decline.

Title	-	Performance of black gram (<i>Vignamungo</i>(L.) Hepper) varieties in changing weather condition
Researcher	-	Mane, RamkrashnaBalaji
Research Guide	-	Asewar, B.V.
Department	-	Agricultural Meteorology
Subject	-	Agricultural Meteorology
Degree	-	M.Sc
Thesis No.	-	17110
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033727
Abstract	-	

An experiment was conducted at experimental farm of Department of Agril. Meteorology, College of Agriculture, VasanttraoNaikMarathwadaKrishiVidyapeeth, Parbhani, during *Kharif* season 2016 entitled “Performance of black gram (*Vignamungo*(L.) Hepper) varieties in changing weather condition” to find out most suitable week for sowing of black gram in *kharif* season, to study the relationship between meteorological parameters and different dates of sowing affects on yield of black gram. The experiment was conducted in split plot design with three replications. Treatments comprised of four sowing dates in main plot D₁ (25th MW), D₂ (27th MW), D₃ (29th) and D₄ (31th MW), with three varieties in sub plot *viz.* TAU-1, BDU-1 and AKU-15. The experiment was sown with spacing 30×10 cm. Gross and net plot size *viz.* 4.2 m x 3.5 m and 3.6 m x 3.1 m, respectively. The sowing was done by dibbling method on respective dates of sowing. The results obtained from the experiment revealed that all the biometric observations (plant height, number of functional leaves, dry matter, number of pods) in *kharif* black gram were significantly highest in second date 27th MW (02 to 08th July) followed by first sowing date 25th MW (18 to 24th June), third sowing date 29th MW (16th to 22th July) and fourth sowing date 31th MW (30th July to 05th Aug). The black gram variety BDU-1 was found to be highly productive as compared to TAU-1 and AKU-15.

Growing degree days (GDD) for black gram crop under different sowing dates and varieties from sowing to maturity.

The mean heat unit requirement date of sowing and varieties from the life cycle *i.e.* emergence to harvest stage (P₁ to P₆) stage was 303.7⁰C day. The total heat load was reported during D₁ (MW 25) was 1917⁰C day and it was followed by D₂ (MW 27) (1865.3⁰C), D₃ (MW

29) (1786.3 °C) and D₄ (MW 31) (1700.2 °C) day. It indicated that the total heat load was decreased from D₁ to D₄ it may be due to delayed sowing.

Date of sowing D₁ (MW 25) indicated more heat load (1917 °C day) than rest of the treatments it may be due to maximum air temperature prevailed at sowing time. Date of sowing D₄ (MW 31) lowest heat load (1700.2 °C day) heat unit required for attaining various phenophases in D₄ (MW 31) date of sowing due to effect of temperature and delayed sowing during the crop growing season. The total heat unit requirement of all the varieties during crop life cycle was 1800 °C, 1852.8 °C, and 1817.3 °C for TAU-1, BDU-1 and AKU-15 respectively.

Total HTU required during total crop growth period was highest in D₂ (MW 27) 1521.1 °C day hour as compare to remaining treatments. In case of varieties V₂ (BDU-1) required highest total HTU 1483.6 °C day hour as compare to other three varieties.

Date of sowing D₁ (MW 25) indicated more photo thermal units (i.e. 25529.7 °C day) than rest of the treatments it may be due to maximum air temperature prevailed at sowing time. Date of sowing D₄ (MW 31) lowest heat load (22643.6 °C day) PTU required for attaining various phenophases. Total photo thermal units requirement of all the varieties during crop life cycle was 23972.8 °C, 24674 °C, and 24203.0 °C for TAU-1, BDU-1 and AKU-15, respectively.

The correlation study was carried out between weather variables prevailed during (P₁) to (P₆) growth stages of different varieties under different sowing dates. The correlation coefficient showing degree of association between seed yield and weather variables prevailed during phenophages of black gram crop. The rainfall and rainy day has been positively correlated with seed black gram yield at P₂ and P₃ stages however, it was negatively correlated at P₅ and P₆ stages of TAU-1, BDU-1 and AKU-15 varieties.

The maximum temperature has positively correlated with seed black gram yield at P₁, P₅ and P₆ stages however it was negatively correlated at P₂ and P₃ stages of TAU-1, BDU-1 and AKU-15 varieties. The minimum temperature has positively correlated with seed black gram yield at P₁, P₂ and P₃ stages of TAU-1, BDU-1 and AKU-15 varieties has significant. The RH-I and RH-II has positively correlated with black gram yield at P₂ and P₃ stages of all varieties however it was negatively correlated at P₁, P₅ and P₆ stages of TAU-1, BDU-1 and AKU-15 varieties. The evaporation has positively correlated with black gram yield at P₅ and P₆ stages however it was negatively correlated at P₂ and P₃ stages of all varieties of TAU-1, BDU-1 and AKU-15. The B.S.S has negatively correlated with black gram yield at all stages except P₅ and P₆ stages has

been positively correlated of TAU-1, BDU-1 and AKU-15 varieties. The wind velocity has positively correlated with black gram yield at all stages of TAU-1, BDU-1 and AKU-15 varieties.

Title	-	Performance of soybean (<i>glycine max</i>) varieties under varied weather condition
Researcher	-	Chavan, KiranKundlik
Research Guide	-	Khobragade, A.M.
Department	-	Agricultural Meteorology
Subject	-	Agricultural Meteorology
Degree	-	M.Sc
Thesis No.	-	17128
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033870
Abstract	-	

A field investigation entitled “PERFORMANCE OF SOYBEAN (*Glycine max*) VARIETIES UNDER VARIED WEATHER CONDITION” was designed and conducted during *Kharif* season of 2016 at College of Agriculture, VasanttraoNaikMarathwadaKrishiVidyapeeth, Parbhani.

The experiment was laid out in split plot design with three replication and two factors viz., date of sowing D₁ (MW27), D₂ (MW28), D₃ (MW29) and D₄ (MW30), and cultivars V₁ (MAUS-158), V₂ (MAUS-71), V₃ (MAUS-81), V₄ (JS-335) to study crop weather relationship under different dates of sowing in soybean.

In the present investigation the biometric observations viz. plant height, number of leaves plant⁻¹, number of branches plant⁻¹, number of pods plant⁻¹, and dry matter plant⁻¹ were recorded at 15 days interval. These observations recorded were significantly highest in treatment D₁ (MW 27). The seed yield, stalk yield, biological yield, harvest index and yield components viz. number of seed per pod⁻¹, weight of pods per plant⁻¹, weight of seeds plant⁻¹ and 1000 seed weight were highest in treatment D₁ (MW 27). Among the varieties, V₁ (MAUS 158) produced highest yield and lowest yield was recorded from V₃ (MAUS 81).

It was observed that duration of each phenophases from sowing to maturity was shown as follows, sowing to emergence (P₁), emergence to seedling (P₂), seedling to branching (P₃), branching to flowering (P₄), flowering to pod formation (P₅), pod formation to grain formation (P₆), grain formation to pod development (P₇), pod development to pod containing full size grain (P₈), pod containing full size grain to dough stage (P₉) and dough stage to maturity

(P₁₀). First date of sowing had more duration as compared to delayed sowing. This shortening of duration was due to thermal stress at later sowing dates.

The correlation study was carried out between weather variables prevailed during P₁ to P₁₀ growth stages of different cultivars under different sowing dates. The correlation coefficient between seed yield and weather variables prevailed in different phenophases of soybean cultivars. The rainfall showed significantly positive correlation with grain yield of soybean cultivars V₁ (MAUS-158), V₂ (MAUS-71), V₃ (MAUS-81) and V₄ (JS-335) at the P₂, P₃, P₈, P₉ and P₁₀ crop growing stages however it showed highly significant negative correlation at P₅ and P₇ stages.

It was observed that correlation between weather parameters and soybean major pests i.e. Girdle beetle, Leaf miner, Tobacco leaf eating caterpillar, American bollworm, Semilooper and Whitefly was non-significant, except girdle beetle was negatively significant with wind speed.

Total GDD required during total crop growth period was highest in D₁ (MW 27) i.e. 104.9⁰C as compare to remaining treatments. In case of cultivars V₁ (MAUS-158) required highest total GDD i.e. 104.2⁰C as compare to remaining cultivars, whereas, the lowest total GDD was recorded in D₄ (MW30) i.e. 97.0⁰C, in case of cultivar V₃ (MAUS 81) i.e. 98.4⁰C. It may be due to different growth period.

Title	- Phenological studies on cotton crop under varied weather condition
Researcher	- Dhavare, S.U.
Research Guide	- Khobragade, A.M.
Department	- Agricultural Meteorology
Subject	- Agricultural Meteorology
Degree	- M.Sc
Thesis No.	- 17136
Krishikosh link	- http://krishikosh.egranth.ac.in/handle/1/5810033879
Abstract	-

The present experiment entitled “Phenological studies on cotton crop under varied weather condition” was carried out during *kharif* season 2016-17 under rainfed condition at experimental farm of Department of Agricultural Meteorology, College of Agriculture, VasantnaoNaikMarathwadaKrishiVidyapeeth, Parbhani.

The experiment was conducted in split plot design with three replications. Treatments under study were four sowing dates in *kharif* season i.e. D₁ (25th MW), D₂ (26th MW), D₃ (27th MW) and D₄ (28th MW), and three *Bt* hybrids Mallika, Ajeet-155 and Rashi-2 were sown with spacing 120 x 45 cm². The gross plot size was 7.2 x 3.6 m² and net plot size was 4.8 x 2.7 m². The sowing of seed was done by dibbling method on respective date of sowing. The meteorological parameters (abiotic factor) play an important role in deciding the success or failure of the crop, because these factors strongly influence the physiological expression of genetic potential of the crops, hence this study was undertaken. The results were obtained from the experiment it was found that all the biometric observations (plant height, plant width, number of branches, number of squares, number of flowers and number of bolls) in *kharif* cotton were significantly highest in treatment of sowing in 25th MW (22nd June) followed by second sowing date 26th MW (29th June) under the suitable condition in *kharif* 2016-17. Amongst the hybrids all the biometric observations were recorded significantly highest in Ajeet-155 and highest yield also recorded in Ajeet-155. Significantly highest seed cotton yield (2406.4 kg ha⁻¹) was obtained with sowing in 25th MW followed by sowing in 26th MW (2311.7 kg ha⁻¹) which was all yield attributing characters. The lowest seed cotton yield was recorded in 28th MW sowing. Hence, sowing of *kharif* cotton should be completed on 25th MW or before 26th MW; otherwise there is

chance of reduction in number of reproductive structures like squares, flowers and bolls, which results in reduction of seed cotton yield with delayed sowing under rainfed climatic condition.

The GDD also showed a significant variation among different sowing dates and *Bt* hybrids. The average growing degree days were recorded among the different sowing dates was 1865.3 °C days at the base temperature of 15.5 °C. The highest number of GDD (1939.2 °C days) were accumulated in 25th MW sowing. The lowest number of GDD (1810.1 °C days) accumulation was recorded in 27th MW. The total number of GDD was significantly influenced by different hybrids and among *Bt* hybrids the highest number of GDD were accumulated by Rashi-2 (1873.6 °C days) and the average GDD were accumulated in different hybrids was 1865.3 °C days.

The rainfall and rainy days has been positively correlated with seed cotton yield at all stages except P₄ stage has negatively correlated of V₁, V₂ and V₃ of cotton crop. The maximum temperature has been positively correlated with seed cotton yield at P₂, P₅ and P₇ however , it was negatively correlated at P₃,P₆ and P₁₀ stages of V₁, V₂ and V₃ of cotton crop. The minimum temperature has been positively correlated with seed cotton yield at P₁ , P₂, P₃, P₆ and P₇ however , it was negatively correlated at P₉ and P₁₀ stages of V₁, V₂ and V₃ of cotton crop. The RH-I has been positively correlated with seed cotton yield at P₃ and P₇ however , it was negatively correlated at P₂ , P₈ , P₉ and P₁₀ stages of V₁, V₂ and V₃ of cotton crop. The RH-II has been positively correlated with seed cotton yield at all stages except P₅ stage has been negatively correlated of V₁, V₂ and V₃ of cotton crop. The evaporation has been negatively correlated with seed cotton yield at all stages except P₆ and P₉ stage has been positively correlated of V₁,V₂ and V₃ of cotton crop. The BSS has been negatively correlated with seed cotton yield at all stages except P₅ stage has been positively correlated of V₁, V₂ and V₃ of cotton crop. The wind velocity has been positively correlated with seed cotton yield at P₂, P₄ and P₆ however it was negatively correlated at P₃, P₉ and P₁₀ stages of V₁, V₂ and V₃ of cotton crop.

The incidence of aphids and jassid started from 33th MW (6 aphids/ 3 leaves) and (4.2 jassid / 3 leaves) respectively and decrease upto 37th MW (3 aphids /3 leaves) and 35th MW (2 jassid/3 leaves) then increased upto 40th MW (7 aphid/3 leaves). During 40th MW record of 109.5 mm rainfall the aphid and jassid washed out and the population was reduced but again it was

increased up to 52 MW .The highest peak incidence aphid and jassid observed in 52th MW when the Rainfall, Rainy days, T max, T min, Humidity I and II, and BSS was 00 mm, 00 rainy days, 25.9 °C, 6.9 °C, 66 %, 25% and 8.6 hr respectively.

Title - **Agroclimatic characterization of cotton crop under parbhani district**

Researcher - Dendage, Vaishali Ramesh

Research Guide - Khobragade, A.M.

Department - Agricultural Meteorology

Subject - Agricultural Meteorology

Degree - M.Sc

Thesis No. - 17144

Krishikosh link - <http://krishikosh.egranth.ac.in/handle/1/5810033993>

Abstract -

An investigation was carried out during 2015-2016 at Department of Agricultural Meteorology, College of Agriculture, Vasanttrao Naik Marathwada Krishi Vidyapeeth, Parbhani entitled as “Agroclimatic Characterization of Cotton Crop under Parbhani District” with an objective to study the Agroclimatic characterization of cotton crop in Parbhani district, to assess the phenological stages in relation to weather parameter of cotton and to develop the regression model to predict the yield with meteorological variables.

In study of climate condition during 1985-2014 (30 years data) showed variability in climatic condition at Parbhani district level of Marathwada region. Temperature variability at Parbhani district results into change in the yield for cotton crop in Marathwada region.

These data was converted in to the average growing period of cotton crop i.e. (23MW to 5MW).

Variability in temperature and sunshine hours in Parbhani district results into change in GDD, HTU and PTU of cotton crop. The maximum GDD, HTU and PTU were observed (2500.03 °C days), (17286.8 °C days) and (28455.3 °C days) respectively.

The highest total GDD, HTU and PTU recorded NHH-44 hybrid was 3994.3 °C days, 14779 °C days and 24497 °C days hrs respectively as well as in Ajeet-155 was 3918.8 °C days, 13625 °C days and 23822 °C days hrs respectively. Whereas, the lowest number of GDD, HTU and PTU was accumulated Ajeet-155 variety in 2013 (3751.4 °C days), 2013 (11590 °C days) and 2013 (21861 °C days hrs).

In Cotton crop rainfall was necessary at emerging, square formation, flowering and boll setting stage but at boll bursting stage there was no necessity of rainfall. Boll bursting

stage was required low temperature (7.6-17.1 °C), low relative humidity-I and II (58-81% and 37-52%) and also boll setting was required high temperature range 19.6 °C to 31.9 °C. At square formation stage was required low bright sunshine hours i.e. 4.2 hrs.

The correlation in between variable parameter (i.e. rainfall, Maximum temperature, minimum temperature and bright sunshine hours with phenophases) and non-variable parameters (i.e. seed cotton yield) found significant. In Parbhani district rainfall was observed positively correlated with seed cotton yield in cotton crop in P₁ stage and highly negatively correlated at P₉ stage. While Tmax.was positively correlated with seed cotton yield at P₅ stage and P₈ stage. Tmin.was negatively correlated at P₃ and P₉ stage and P₈ stage has positively correlated with seed cotton yield. Bright sunshine hours were highly negatively correlated at P₇ and P₈ stage with seed cotton yield of cotton crop of NHH-44 hybrid variety. Regression equation for Parbhani district showed negatively significant effect of minimum temperature at seedling to square formation, bright sunshine hours at boll bursting to 1st picking and rainfall at 2nd picking to 3rd picking and positively significant effect of maximum temperature at flowering to boll bursting with seed cotton yield of NHH-44 hybrid variety.

Title	-	Studies on the effect of osmoprotectants on microclimate of soybean (<i>glycine max</i> l.)
Researcher	-	Krishna Murthy, S.R.
Research Guide	-	Khobragade, A.M.
Department	-	Agricultural Meteorology
Subject	-	Agricultural Meteorology
Degree	-	M.Sc
Thesis No.	-	17179
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034065
Abstract	-	

Soybean (*Glycine max*L. merrill) is the 'golden bean' or 'miracle bean'. Soybean has been recognized as one of the premier agricultural crops today for various reasons. The climatic condition in Marathwada region of Maharashtra is suitable for soybean and the crop is being preferred over others by farmers. However during last 4-5 years, it was observed that the erratic rainfall, gradual increase in temperature during its reproductive cycle and occurrence of dry spell or excess rainfall during its critical growth stages (flowering, pod formation and pod filling) caused water stress which hampered both crop growth and agronomic or intercultural operations in the field and reduced the soybean yield to a great extent.

A field investigation entitled “Studies on the effect of Osmoprotectants on microclimate of soybean (*Glycine max*L.Merrill)” was designed and conducted at agricultural meteorological field in College of Agriculture, VasanttraoNaikMarathwadaKrishiVidyapeeth, Parbhani during *Kharif* season of 2016.

The experiment was laid out in split plot design in which three replications and two factors *viz.*, Date of sowing D₁ (27th June), D₂ (13th July) and D₃ (25th July) and Osmoprotectants spray S₁ (Control), S₂ (Water spray), S₃ (Potassium Nitrate @ 2%), S₄(Potassium Schoenite @ 2%) and to study the Osmoprotectants spray under different dates of sowing of soybean.

In the present investigation the biometric observations *viz.*, number of leaves plant⁻¹, number of branches plant⁻¹, number of pods plant⁻¹, number of root nodules plant⁻¹ and dry matter plant⁻¹ were recorded at 15 days interval. These observations were significantly highest

in treatment D₁ (27th June). The yield components *viz.*, seed yield, stalk yield, biological yield, seed index were highest in treatment D₁ (27th June). Among the Osmoprotectant spray S₃ (Potassium Nitrate @ 2 %) produced higher yield and where as lower yield was recorded in S₁ (Control). It may be due to water stress condition created in the field, dry spell at the time of sowing.

Osmoprotectants spray S₃ (Potassium Nitrate @ 2 %) at 45 and 60 Days after sowing were significantly improved all growth parameters, yield attributes over rest of treatments except S₄ (Potassium Schoenite @ 2 %). The Osmoprotectant spray S₃ (Potassium Nitrate @ 2%) recorded highest yield (1341 kg/ha) as compared to other Osmoprotectants spray.

The Meteorological observations *viz.*, soil moisture content at 15cm, 30cm and 45cm depth and relative water content leaf⁻¹ these observations were significantly highest in treatment D₁ (27th June) and the Osmoprotectant spray S₃ (Potassium Nitrate @ 2 %) was significantly superior over the other Osmoprotectants sprays.

The total Growing Degree Days (GDD) recorded during total crop growth period was highest in D₁ (27th June) i.e. 57.9⁰C as compare to remaining treatments. In case of Osmoprotectants spray S₁ (Control) recorded highest total GDD i.e. 57.71⁰C as compare to remaining Osmoprotectants spray. Whereas lowest total GDD was recorded in D₃ (25th July) i.e. 56.82⁰C. It may be due to different dates of sowing.