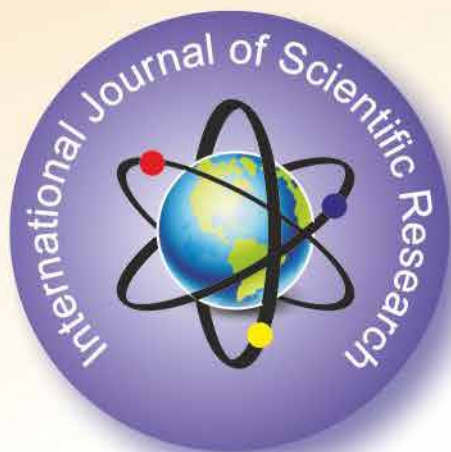


# International Journal of Scientific Research

Indexed with International ISSN Directory, Paris

Volume 1 | Issue 2 | July 2012



ISSN No. 2277 – 8179

A Multi-Subject Journal



ISSN No. 2277 – 8179

**International Journal of Scientific Research**  
**Journal for All Subjects**

<b>Advertisement Details</b>		
<b>Position</b>	<b>B/W (Single Color)</b>	<b>Fore Color</b>
Full Inside Cover	₹ 6250	₹ 12500
Full Page (Inside)	₹ 5000	-
<b>Subscription Details</b>		
<b>Period</b>	<b>Amount Payable</b>	
One Year (12 Issues)	₹ 3000	
Two Year (24 issues)	₹ 5800	
Three Year (36 issues)	₹ 8700	
Five Year (60 issues)	₹ 14400	

You can download the Advertisement / Subscription Form from website [www.gra.in](http://www.gra.in). You will require to print the form. Please fill the form completely and send it to the **Editor, International Journal of Scientific Research** along with the payment in the form of Demand Draft/Cheque at Par drawn in favour of **International Journal of Scientific Research** payable at Ahmedabad.

**Editor-In-Chief**  
**Khansa Memon**  
Editor, Sarah Publishing Academy

**Editorial Advisory Board**

**Dr. Ashok S. Pawar**  
Associate Professor, Dept. of Economic  
Dr. Babaasaheb Ambedkar  
Marathwada University, Aurngabod

**Dr. (Prof) Vijay Kumar Soni**  
Principal,  
Jai Meenesh College, Phagi,  
Jaipur, Rajasthan

**Dr. A.R. Saravankumar**  
Assistant Professor in Education  
DDE, Alagappa University,  
Tamilnadu

**Dr.R.Ramachandran**  
Commerce Dde  
Annamalai University  
Tamilnadu India

**Dr. R Ganpathy**  
Assistant Professor in Commerce  
Directorate of Distance Education  
Alagappa University Karaikudi.

**Dr. Amit Bandyopadhyay**  
Assistant Professor  
Department of Physiology  
University of Calcutta

**Dr. V. Kumaravel ,**  
Professor and Head  
Vivekanandha Buss. School for Women  
Tiruchengode, Namakkal Dist

**Dr. K. Prabhakar ,**  
Professor,  
Department of Manag. Studies,  
Velammal Engg College, Chennai

**Dr. Sunita J. Rathod**  
Maharashtra Education  
Service Group-B  
DIET Dist. Jalna

1. Thoughts, language vision and example in published research paper are entirely of author of research paper. It is not necessary that both editor and editorial board are satisfied by the research paper. The responsibility of the matter of research paper/article is entirely of author.
2. Editing of the **International Journal of Scientific Research** is processed without any remittance. The selection and publication is done after recommendations of atleast two subject expert referees.
3. In any condition if any National/International University denies accepting the research paper published in IJSR then it is not the responsibility of Editor, Publisher and Management.
4. Only the first author is entitle to receive the copies of all co-authors
5. Before re-use of published research paper in any manner, it is compulsory to take written permission from the Editor-IJSR, unless it will be assumed as disobedience of copyright rules.
5. All the legal undertaking related to **International Journal of Scientific Research** is subject to Ahmedabad Jurisdiction.
7. The research journal will be send by normal post. If the journal is not received by the author of research papers then it will not be the responsibility of the Editor and publisher. The amount for registered post should be borne by author of the research paper in case of second copy of the journal.

**Editor,**  
**INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH**  
3, SUHANA, Nr. Rubi Apartment, B/H NID, Rajnagar Road,  
Paldi – 380007. Ahmedabad-Gujarat. (INDIA)  
Contact: +91 98247 02127, +91 88660 03636  
[www.theglobaljournals.com](http://www.theglobaljournals.com) | [ijsr@theglobaljournals.com](mailto:ijsr@theglobaljournals.com)

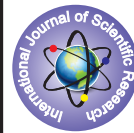
## INDEX

Sr. No.	Title	Author	Subject	Page No.
1	Ionic composition of a freshwater lake and its implications on aquaculture	Dr. Shankar P. Hosmani	Biotechnology	1-2
2	Growth and Performance of Mutual Fund Industry in India	Dr. M. K. Maru	Commerce	3-4
3	Waste Management: A New Paradigm of Contemporary Business	Dr. Vipul Chalotra	Commerce	5-6
4	Rural Financial Services in J&K (A study in the field of financial services sector development)	Tarsem lal	Commerce	7-8
5	Banyan, the National Tree of India	Dr. J.K. Sehgal	Commerce	9-10
6	Impact of Online Marketing on Customers with Special Reference to Coimbatore City	Dr. R. Ganapathi	Commerce	11-15
7	Customers' Attitude towards Housing Loan With Reference to Commercial and Rural Banks	Dr. R. Ganapathi, Mrs. B. VIDYA	Commerce	16-23
8	Consumer Behaviour towards Broiler Chicken Retail Stores With Reference to Madurai City	P. Easwaran, J. Gnanadevan, Dr. R. Ganapathi	Commerce	24-30
9	Data Security and Protection in Cloud Computing	Shameena Begum, V. Ratna Vasuki, K.V.V.Srinivas	Computer Science	31-34
10	Foreign Direct Investment in India – An Explanatory Study	Dr. K.Madhu Babu	Economics	35-38
11	Growth - Saving Causality in India: A Cointegration Analysis	Dr. Shradha H. Budhedeo	Economics	39-42
12	Constitutional perspectives on Labour Wages in India	Dr. Shankar Ambhore, Dr. Dilip Arjune, Manish Parshuram Pawar, Dr. Ashok Shankarrao Pawar	Economics	43-45
13	A Critical Study of Special Economic Zones in India	Dr. Shankar Ambhore, Dr. Dilip Arjune, Manish Parshuram Pawar, Dr. Ashok Shankarrao Pawar	Economics	46-48
14	Industrial Relations - Settlement of Disputes in India	Dr. Shankar Ambhore, Dr. Dilip Arjune, Manish Parshuram Pawar, Dr. Ashok Shankarrao Pawar	Economics	49-50
15	AMLA - ITS MEDICINAL USES	Manisha Gaur	Economics	51-52
16	The Role Of Total Quality Management In Higher Education	Ramesh B. Sakhiya	Education	53-55
17	Perceived Competencies Of Graduate Teacher Trainees In The Intensive Teaching Practice [I T P] Session	Dr M. Parimala Fathima, N.Sasikumar, M. Panimalar Roja	Education	56-58
18	Uchch Siksha Ki Rah Men Dushvariyan	Dr. Anup Chaturvedi	Education	59-60
19	Fault Diagnoses of Rotating Machinery with Advance Signal Processing Methods	Prof. Divyang H. Pandya, Prof. Ankit A. Darji	Engineering	61-63
20	A Hybrid Neural Network Approach for Wind Speed Prediction	S.N Deepa, K.gnana Sheela	Engineering	64-67
21	A Study on Phishing: Preventions and Anti-Phishing Solutions	V.Karamchand Gandhi, Prof R.Senthil Kumar	Engineering	68-69
22	The Killari 1993 Intracratonic Earthquake- a Comparative Study	S.S. Patil, K.L. Karkare, I.B. Ghorade	Environment	70-72
23	Cosmic Plants as Alternative Medicine	Dr. Sneh Harshendra Sharma	Environment	73-77

24	Green Initiatives for Reducing Carbon Footprint	Dr Mahalaxmi Krishnan	Environment Science	78-79
25	Prediction of Urban Sprawl in Hyderabad City using Spatial Model, Remote Sensing and GIS Techniques	S. Indhira Gandhi, Dr. V. Madha Suresh	Geography	80-81
26	Tectono-Provenance and Reservoir Rock Characteristics of the Tipam Sandstones in Parts of Upper Assam Basin	Dr. Pradip Borgohain	Geology	82-84
27	(Jansanchar Aur Bharatiya Samaj)	Dr Subodh Kumar	Journalism	85-86
28	An Overview of Industrial Disputes Settlement Authorities in India	Manish Parshuram Pawar, Dr. Ashok Shankarrao Pawar	Law	87-88
29	Innovative Method of Role Play for Developing English Language Teaching and Learning	K Rajkumar	Literature	89-91
30	Impact of Workers Participation in Management on Industrial Relations	Anuradha Averineni	Management	92-93
31	Consumers Preferences , Behaviour and Satisfaction with respect to banking services quality in Ghaziabad(NCR Region)	Prof(Dr.)H. P. Pandey, Mr. Ashish kumar Singh	Management	94-96
32	Factors Influencing Employee Branding in Higher Educational Institutions: A Special Reference to Management Institutions in Virudhunagar District in Tamilnadu	Jegadeeswari. Mani, Dr. S. Franklin John S.	Management	97-98
33	Evaluation of Service Quality in Internet Banking: An Empirical Study in Coimbatore	Ms. R. Gokilavani, Dr. R. Ganapathi	Management	99-101
34	To Study the Relationship Between Gender & Banking Preferences of Management Graduates at Ibmr, Ahmednagar	Rajendrasingh Pardeshi, Gadekar Vithal Laxman	Management	102-103
35	FCB model of Advertising Strategy	Prof. Arvind Rathod	Management	104-107
36	Assessing Beneficiary Satisfaction with Service Delivery of Non Governmental Organizations (NGOs)	Dr Papori Baruah, Bhaskar Jyoti Barthakur	Management	108-111
37	Current Trends in Human Resource Management	Dr. Kalyani Kenneth, Mrs.R.Aruna jayamani	Management	112-113
38	“Indian Banking – A Future Ahead”	Haresh B. Barot	Management	114-116
39	Financial Inclusion-Banking Services to the Common Man	Dr. M. Venkata Subba Reddy, Mr. M.s.udaya Banu	Management	117-118
40	A study of Service Marketing Mix w.r.to b-schools in Mumbai	Dr. Balaji S. Mudholkar	Management	119-120
41	A Study on the Customers Opinion on the Benefits of the Credit Cards Around Combatore District	Mrs. G. Murali Manokari	Management	121-123
42	A Study on the Job Satisfaction of the Employees at Sri Kannan Departmental Stores, Coimbatore	Mrs. G. Murali Manokari, Mrs.r.kanaka Rathinam, Mr. G. Lenin Kumar	Management	124-126
43	Foreign Direct Investment In Indian Retail Sector: A Critical Evaluation	Dr. Raghavendra Dwivedi, Ram Kumar	Management	127-128
44	Emerging Challenges to Cyber Security-Internet Monitoring with Specific reference to National Security	Triveni Singh	Management	129-131
45	An Empirical Study of Consumer Impulse Buying Behavior in domestic Markets (special reference to Ahmednagar, (M.S) India.)	Gadekar Vithal Laxman	Marketing	132-135
46	Insomnia and the performance of general population: Results from the Insomnia Survey	Miss Ketaki Sathe, Dr G S Shekhawat	Medical Science	136-137
47	Transition in Human Resource for Health: Challenges Ahead	Dr. Pawan Kumar, Dr. Abdul Majeed Khan	Medical Science	138-139

48	Kartageners Syndrome- A Case Report	Dr. Ramakrishna Ghubde, Dr. Archana Shekokar	Medical Science	140-141
49	Perceptual challenges in auditory neural processing in neurodegenerative conditions like Fredereich Ataxia	Mr. Ayas Muhammed, Ms. Archana, Dr. Rajashekhar	Medical Science	142-143
50	Transient Auditory Dysynchrony Due to Non-Maturational Causes Evidenced by ABR – A Case Report	HariPrakash. P, Sangeetha. G, Bhargavi P.G	Medical Science	144-146
51	Study on Sphenoid Sinsuses Variants in Magnetic Resonance Imaging of South Indian Population	Suresh Sukumar, Sushil Yadav	Medical Science	147-148
52	A Study to Find out the Prevalence and Effectiveness of Occupational Therapy Intervention for Pain and Activity Performance in Mobile Users with Risk of Repetitive Strain Injury	KR.Banumathe, V.Guruprasad, Leena Ann Lukose	Medical Science	149-151
53	Modified Falls Behavioral Scale for Indian Community Dwelling Older Adults	V.Guruprasad, Sebestina A D'Souza, KR.Banumathe	Medical Science	152-154
54	The Essence of Employees Training and its Impact on the Work Force in an Industry	Dr. Mohan Singhe	Organization Behavior	155-156
55	Scientific Behaviourism of Watson and Hull : A Philosophical Perspective	Dr. Jatinder Kumar Sharma	Philosophy	157-158
56	The growth of manganese oxide thin films by spray pyrolysis technique	M.Sudha, P.Duraisamy	Physics	159-161
57	Terrorism and Competitive Terrorism in India	S. Sreejith, P. Sakthivel	Political Science	162-164
58	Kuposhan Se Karahta Bachpan	Dr. Anup Chaturvedi	Social Science	165
59	A new species of MicroveliaWestwood, 1834 from India	V.K. Khandelwal	Zoology	166-167
60	Effects of climate change on cotton and options to mitigate and adaption	G. K. Kataria, M. D. Khanpara	Agriculture	168-170

## EFFECTS OF CLIMATE CHANGE ON COTTON AND OPTIONS TO MITIGATE AND ADAPTION



### AGRICULTURE

**KEYWORDS:** Atmospheric CO<sub>2</sub>, boll, climate, cotton, temperature, yield.

**G. K. KATARIA**

COTTON RESEARCH STATION, JUNAGADH AGRICULTURAL UNIVERSITY, MOTIBAUG, JUNAGADH-362001

**M. D. KHANPARA**

COTTON RESEARCH STATION, JUNAGADH AGRICULTURAL UNIVERSITY, MOTIBAUG, JUNAGADH-362001

### ABSTRACT

*Climate change is effect on cotton production as a result of higher concentrations of CO<sub>2</sub> and increases in temperature.*

*Cotton has certain resilience to high temperatures and drought due to its vertical taproot. The crop is however sensitive to water availability, particularly at the height of flowering and boll formation. Rising temperatures favour plant development, unless day temperatures exceed 32°C. Increases in atmospheric CO<sub>2</sub> will also favour plant development. In order to produce cotton lint, 5019m<sup>3</sup>/ton of blue and 15198m<sup>3</sup>/ton green water were required, making Indian cotton one of the most water-intensive cotton of the country. In term increased pests, water stress, diseases, and weather extremes will pose adaptation challenges. Limited increases in temperatures could favour cotton plant growth and lengthen during the cotton growing season. It has not been established that 41.8°C is the upper limit, particularly in India, has shown that heat stress is a big constraint to increasing yields.*

### Introduction

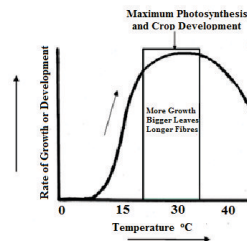
Cotton is a perennial with an indeterminate growth habit. Climate change impacts on cotton growth and development that influence yield and fibre quality will most likely be a result of the net effects of increases in CO<sub>2</sub> concentration, reduced water availability and increased atmospheric evaporative demand as a result of lower rainfall and relative humidity and increases in temperature (Ton, 2011). Cotton is grown on every continent except Antarctica, and in over 60 countries in the world. In India and many countries, cotton is one of the primary economic bases which provide employment and income for millions of people involved in its production, processing, and marketing (Chaudhry *et al.*, 2003). All processes leading to square, blossom and boll initiation, and maturation are temperature-dependent

### Impact of climatic changes on cotton

Cotton plants respond to changing environments. The response depends on the stage of development of the plant. Key stages in cotton plant development are: a) conditions at the time of planting, b) plant development in early season, c) flowering, d) boll formation and e) conditions towards the end of the season. Indian cotton production has a very high evaporative (800-1000mm). Rain comes during a short period of time (but with a large quantity) which results in low yields. Calculations were made to estimate the water footprint of cotton by Chapagain *et al.*, 2006. They also showed that in order to produced cotton lint 5019 m<sup>3</sup> ton<sup>-1</sup> of blue (irrigation water) and 15198 m<sup>3</sup> ton<sup>-1</sup> of green (rainfall) water were required, making Indian cotton one of the most water-intensive cotton in the world, using approximately 15% of the water resources of the country (ICAC, 2007).

### Effect of high temperatures on leaf Photosynthesis

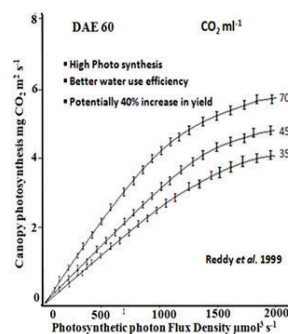
Climate change may increase the frequency of these high temperatures. Cotton plants maintain optimum growing temperatures by opening stomata in the leaves, allowing water to pass out and evaporate, thus cooling leaves (transpiration). Excessively high temperatures (greater than 35°C) during the day can reduce photosynthesis while warm nights (above 25°C) mean that leaf temperature remains high, and respiration remains high, consuming stored assimilates. Maintenance respiration approximately doubles for every 10°C rise in temperature (Figure 1).



**Figure 1: Effect of high temperatures on leaf Photosynthesis**

### Effects of climate on CO<sub>2</sub> level

Cotton will grow more vigorously as the amount of CO<sub>2</sub> in the air increases. Leaves will likely be larger, thereby giving plants a greater photosynthetic surface area, which subsequently facilitates growth. With more atmospheric CO<sub>2</sub>, greater numbers of branches and fruiting sites will likely develop, and this in turn, should ultimately provide for higher lint yields (ICAC, 2007). According to Reddy *et al.* (1998), at temperatures greater than 30° C most of the fruit was aborted regardless of CO<sub>2</sub> concentration (Figure 2).



**Figure 2: Effects of photosynthetic photon flux density on canopy (Source: Bange M., 2007).**

### Effects of high temperature on boll retention

Boll retention is more sensitive to high temperatures can produce bud shedding, which is the most common reason for loss of fruit forms, boll size and the maturation period both decreased as the temperature increased (Reddy *et al.*, 1999). It determined that boll growth decreases significantly and fruit is shed 3-5 days after blossom in temperatures over 32°C (ICAC, 2007). Thus, the upper limit of cotton for blossom and fruit period is 32°C (Table 1). Cotton is

successfully grown at 28.2°C in China and 37.6°C in India, 36.8°C in Pakistan and 41.8°C in Sudan. It has not been established that 41.8°C is the upper limit, but in India, Pakistan and Syria, has shown that heat stress is a big constraint to increasing yields. These countries successfully developed heat tolerant varieties during the 1970s and 1980s (ICAC, 2007).

**Table 1: Optimum climate needs for cotton crop.**

Growth Stage	Average Daily Temperature Celsius*	Average Daily Temperature Fahrenheit*	Daily Crop Water Use (mm)*
Planting (Soil)	18° Minimum	65° Minimum	>0
Planting (Air)	>21°	>70°	
Vegetative Growth	21°-27°	70°-80	1-2
1st Square	-	-	2-4
Reproductive Growth	27°-32°	80°-90°	3-8
Peak Bloom	-	-	8
1st Open Boll	-	-	8-4
Maturation	21°-32°	70°-90°	4

**Effect of high temperature on cotton quality**

Quality is less sensitive to high temperatures than yield. In general, cotton growing in a hot climate will have a higher micronaire due to the thicker rings of cellulose that are deposited daily in the fiber.

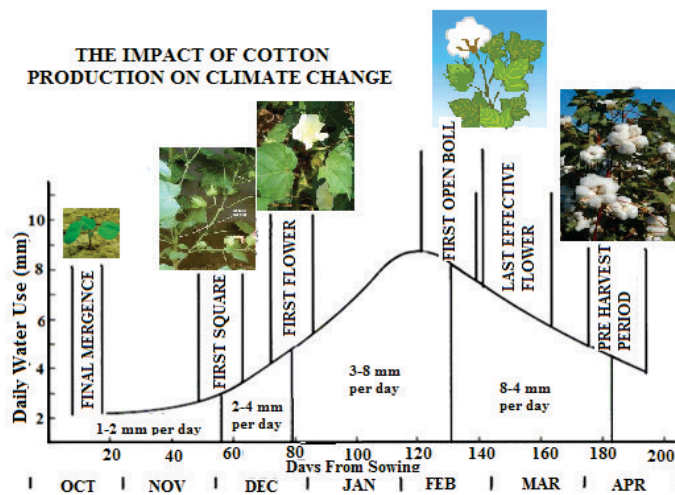
Cotton fiber needs a minimum of 40 to 50 days to mature regardless of temperature (Bange, M., 2007). As photosynthesis increases with temperature in the absence of water stress, more resources are available to mature the fibres thus increasing micronaire.

**Effect of temperature on the seed cotton yield**

When hot temperatures occur prior to bloom or after boll set, yield is often increased. Hot temperatures pre-bloom speed the arrival of the bloom period and occur at a time when water use is low and the root system is still expanding into fresh soil moisture. Hot temperatures after boll set hasten the maturation and opening of the crop. High night temperatures are detrimental to young boll set and boll size regardless of the moisture status, because the plant does not cool itself at night. Minimum night temperatures in the 80's decrease yield due to the high respiration and reduced supply of carbohydrates, resulting in the same "adjustment of boll load".

**Effect of temperature on the agronomy of cotton**

Cotton needs favourable growing conditions with respect to temperature, sunshine and soil moisture. Cotton requires a total of 105 to 125 days of sufficient soil moisture to grow. In tropical regions, 2 to 4 mm of water are needed daily at the beginning and the end of the growing period, while at the height of flowering 5 to 7 mm are required daily according to climatic zone (Figure 3). If a flower bud, flower or boll is shed, the cotton plant quickly tries to compensate that loss through the production of more flower buds or even retaining buds that would otherwise have been shed (Chaudhry and Guitcount, 2003).



**Figure 3. Different growth stages for cotton and their demand for water. (Source Freeland et al, 2007).**

**Effect of temperature on attack of insect pest and diseases**

Insects are a recognized threat to cotton production throughout the world. Wu et al. (2007) reported that (Bt) cotton shows less Bt toxin after exposure to elevated CO2, which might affect plant-bollworm interactions. Karl et al. (2009) state that higher temperatures that reduce the effectiveness of certain classes of pesticides (pyrethroids and spinosad). Higher CO2 levels will increase the severity of diseases, induce fungal growth and spore formation, and will destroy more plant tissue.

**Effect of temperature on water availability**

Plants need adequate water to grow and to maintain their temperature within an optimal range. The amount and timing of water availability during the growing season, through precipitation or irrigation, are critical for cotton. If water supply variability increases, it will affect plant growth and cause reduced yields (Karl et al., 2009). However, yields for irrigated cotton are much higher (3,000–4,000 kg of seed cotton/ha) than in rain-fed cotton (1,000–2,000 kg of seed cotton ha<sup>-1</sup>). Therefore, no less than 73% of all cotton fibre worldwide has actually been grown under some conditions of irrigation (full or supplementary irrigation). The water footprint is defined as the total volume of fresh water that is used to

produce a unit of a good or service. Cotton's share of the global agricultural water footprint is estimated at 3%. This is proportionate to cotton's global land use footprint of 2.5%, but will of course be very pronounced in large irrigated production areas.

**Overall impact of climate changes in India**

India is the second largest producer of cotton worldwide. Cotton is grown in India in three distinct zones: Central, South and North. Temperatures are expected to increase all over India. Rainfall intensity during monsoons may become an increasing problem. Higher temperatures in already hot areas may hinder cotton development and fruit formation. Rain-fed cotton production may suffer from higher climate variability leading to periods of drought or flooding. Irrigated cotton, particularly in northern India, may suffer from lower water availability due to the upstream reduction of snow and ice from Himalayan and Tibetan Plateau glaciers and snow fields (UNFCCC, 2008).

**OPTIONS TO ADAPTATION AGAINST CLIMATE CHANGE**

As climate change alters the economics of production, rural cotton farming communities will have to formulate different adaptation strategies. The following options can be distinguished to adapt to

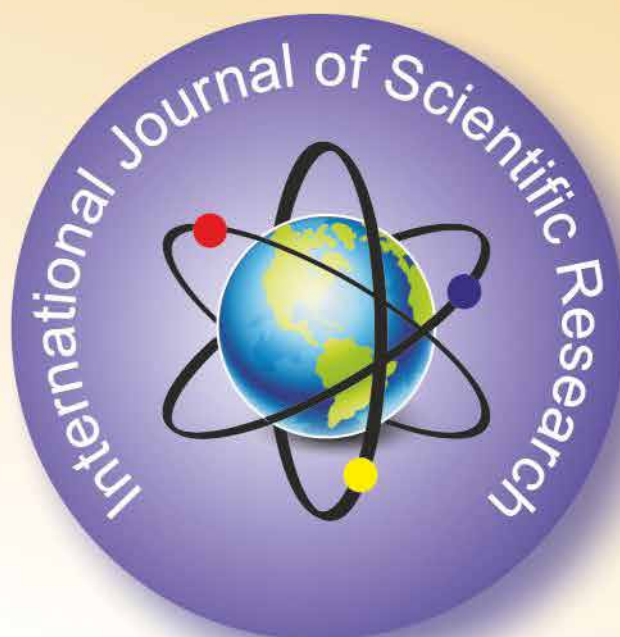
climate change:

- 1) Stop any unnecessary loss of nutrients for the farming system, preventing soil erosion and abandoning the burning of cotton crop residues where still applied.
- 2) Favour a cropland design that has plant diversity and that favours soil fertility management, e.g., through the inclusion of cover crops or perennials.
- 3) Adjust sowing dates to offset moisture stress during the warm period, to prevent pest outbreaks and to make best use of the length of the growing season.
- 4) Minimize the period that land lays bare, in order to slow down loss of organic matter and soil humidity and soil erosion in general.
- 5) Minimize soil tillage in order to prevent loss of soil organic matter – a natural source of soil fertility and storing water for plant uptake.
- 6) Breed cotton varieties that are more resistant to heat stress, drought spells, weeds, pests and diseases, etc.
- 7) Optimize the use of sustainable, natural fertilizing sources in cotton production, including nitrogen-fixing bacteria, crop rotations, compost and composted manure.
- 8) Optimize the efficiency of additional fertilizer use where required, because of its costs and carbon fuel footprint. Synthetic fertilizer use is particularly high in irrigation.
- 9) Optimize the water use efficiency in the production of irrigated cotton, because of the irrigation water's costs and carbon fuel footprint.
- 10) Optimize the use of pesticides, herbicides and defoliant because of their costs and carbon fuel footprint.

## References

1. Bange, M. (2007). Effects of climate changes on cotton growth and development. In: *The Australian Cotton Grower*, pp:41-45.
2. Chaudhry, M. Rafiq and Andrei Guitchounts, (2003). *Cotton Facts*, International Cotton Advisory Committee, Technical Paper No.25 of the Common Fund for Commodities. The UN, New York.
3. Chapagain, K.A. Hoekstra, Y.A. Savenije, G.H. and Gautam, R., (2006). The water footprint of cotton consumption: An assessment of the impact of worldwide consumption of cotton producing countries. *Economics*, 60:186-203.
4. Freeland, B.T., Pettigrew, B., Thaxton, P. and Andrews, L.G. (2007). Chapter 13A: Agro-meteorology and cotton production. Draft 3rd Edition of Gamp, Guide to Agricultural Meteorological Practices (WMO No.134).
5. ICAC (2007). Global warming and cotton production –Part 1. In: *ICAC Recorder*, 25(4):12-16. International Cotton Advisory Committee.
6. Karl, T.R., Melillo, J.M. and Peterson, T.C. (2009). Global climate change impacts in the United States. Cambridge Uni. Press, USA.
7. Reddy, K.R., Hodges, H.F. and McKinion, J.M. (1998). Photosynthesis and environmental factors. In: *Proc. Beltwide Cotton Conf.*, San Diego, California, Vol.2. Memphis, Natl. Cotton Counc. Am.
8. Reddy, K.R., Davidonis, G.H., Johnson, A.S. and Vinyard, B.T. (1999). Temperature regime and CO<sub>2</sub> enrichment alter cotton boll development and fiber properties. *Agron. J.*, 91:851–858.
9. Ton, P. (2011). Cotton and Climate Change. Impacts and options to mitigate and adapt. International Trade Centre (ITC) UNCTAD/ WTO, Switzerland.
10. UNFCCC (2008). Climate change: Impacts, vulnerabilities and adaptation in developing countries. UN Framework Convention on Climate Change.
11. Wu G., Chen, F.J., Ge, F. and Sun, Y.C. (2007). Effects of elevated carbon dioxide on the growth and foliar chemistry of transgenic Bt cotton. In: *Journal of Integrative Plant Biology* 49(9):1361-1369.





**Sara Publishing Academy**  
**INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH**  
Journal for All Subjects

**The Editor,**

**INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH**

8-A, BANAS, Opp. SLU Girls College, NR. Congress Bhavan,  
Paldi – 380006. Ahmedabad-Gujarat. (INDIA)

Contact: +91 98247 02127, +91 88660 03636

Website : [www.theglobaljournals.com](http://www.theglobaljournals.com)

Email Id: [ijsr@theglobaljournals.com](mailto:ijsr@theglobaljournals.com)