



Dr. Keshav Raj Kranthi
Director CICR Nagpur
Joined Agricultural Research Service in 1991

Patents

K. R. Kranthi: Patent 'Rapid detection of Bt Cry Toxins' granted in 4 countries South Africa, China, Mexico and Uzbekistan

Country	Date	Patent No.
China	29.05.2003	03817641.6
Mexico	26.11.2004	PA/a/2004/011769
Uzbekistan	30.11.2004	20040451
South Africa	21.12.2004	200410268

Awards/Recognition/Honors

- International Cotton Researcher of the Year 2009, ICAC Washington
- Fellow of the National Academy of Agricultural Sciences: 2009
- Team leader: ICAR Award for outstanding team research 2006.
- Ph.D Gold Medal 1991 IARI
- Hexamar/ISCI Award 1999
- Krishi Gaurav Puraskar, 2010, Bharat Krishak Samaj Maharashtra:
- Bhumi-Nirman Award 2011' Madhya Pradesh

Books

1. **Kranthi K. R.** 2012 Bt Cotton Q&A. (60 pp) Published by Indian Society for Cotton Improvement, Mumbai.
2. **Kranthi K. R.** 2005, **Insecticide Resistance:** (160 pp). Published by CICR, Nagpur & ICAC, Washington.
3. **D. A. Russell & K. R. Kranthi, 2007, Sustainable bollworm control in small scale production systems:** (180 pp) Published by ICAC, Washington.
4. **Kranthi K. R., M.V. Venugopalan, R. H. Balasubramanya, Sandhya Kranthi, Sumanbala Singh, Blaise Desouza,** (2011). Book of Papers. Excel India Publishers, New Delhi. World Cotton Research Conference – 5, Mumbai, India
5. **Kranthi K. R., et al.,** Advances in Cotton IPM, 2011. Special Bulletin Published by CICR. pp. 36

Research / Review Papers

International Journals

- Shashi Kumar, Raj K. Bhatnagar, Keshab R. Kranthi, Swapan K. Datta. 2014. The legal battle over field trials of GM crops. *Nature India*. doi:10.1038/nindia.2014.14; Published online 31 January 2014
- Behere G. T., Tay W, T., Russell D. A., Kranthi K. R., Batterham P. 2013. Population Genetic Structure of the Cotton Bollworm *Helicoverpa armigera* (Hu"bner) (Lepidoptera: Noctuidae) in India as Inferred from EPIC-PCR DNA Markers. **PLoS ONE** 8(1): e53448. doi:10.1371/journal.pone.0053448

- Rishi Kumar, Mukesh Natharwal, Rahul Chauhan, Vijender Pal and Kranthi K. R.. 2012. Evaluation of eco-friendly control methods for management of mealybug, *Phenacoccus solenopsis* R Tinsley in cotton. **Journal of Entomology**, 9 (1); 32-40
- Mukherjee AK, Chahande PR, Meshram MK, Kranthi KR, 2012. First report of Polerovirus of the family Luteoviridae infecting cotton in India. **New Disease Reports** 25, 22.
- Kranthi, K. R., V. Nagrare, S. Vennila and S. Kranthi 2011 "Package of Practices for Managing Mealybug on Cotton" **ICAC Recorder** March 2011 14-22
- Peshin, R., Dhawan, A. K., Kranthi, K. R. and Singh, K. 2009. Evaluation of the benefits of an insecticide resistance management programme in Punjab in India. **International Journal of Pest Management**, 55, 3,207- 220
- Kranthi, K. R., Davis, M., Mayee, C. D., Russell, D. A., Shukla, R. M., Usha, S., Mansi, K., Divya, and S. Kranthi. 2009. Development of a colloidal-gold based lateral-flow immunoassay kit for 'quality-control' assessment of pyrethroid and endosulfan formulations in a novel single strip format. **Crop Protection**, 28, 428-434.
- Kranthi, S., C.S. Dhawad, S. Naidu, A. Bharose, A. Chaudhary, V. Sangode, S.K. Nehare, S.R. Bajaj, K.R. Kranthi. 2009. Susceptibility of the cotton bollworm, *Helicoverpa armigera* (Hubner) (Lepidoptera: Noctuidae) to the *Bacillus thuringiensis* toxin Cry2Ab before and after the introduction of Bollgard-II. **Crop Protection**, 28, 5: 371-375
- Nagrare, V. S., Kranthi, S., Biradar, V. K., Zade, N. N., Sangode, V., Kakde, G., Shukla, R. M., Shivare, D., Khadi, B. M. and Kranthi, K. R. 2009. Widespread infestation of the exotic mealy bug species, *Phenacoccus solenopsis* (Tinsley) (Hemiptera: Pseudococcidae) on cotton in India. **Bulletin of Entomological Research**, 99, 5: 537-545
- Behere, G. Tay, T. W., Russell, D., Heckel, D. G., Appleton, B. R. Kranthi, K. R. and Batterham, P. 2007. Mitochondrial DNA analysis of field populations of *Helicoverpa armigera* and its relationship to *H. zea*. **BMC Evolutionary Biology**, 7: 117-127.
- Kranthi, K. R., Dhawad, C. S., Naidu, S. R., Mate, K., Behere, G. T., Wadaskar, RM. and Kranthi, S. 2006. Inheritance of resistance in Indian *Helicoverpa armigera* (Hübner) (Noctuidae: Lepidoptera) to Cry1Ac toxin of *Bacillus thuringiensis*. **Crop Protection**, 26:42-49
- Kranthi, K. R. 2005. Bollworm resistance to Bt cotton in India. **Nature Biotechnology**. 23: 1476-1477
- Mallikarjuna, N, Kranthi, K. R., Jadhav, D. Kranthi, S & Chandra. 2004. Influence of foliar chemical compounds on the development of *Spodoptera litura* in interspecific derivatives of groundnut. **Journal of Applied Entomology**, 128: 321-328.
- Kranthi, S., Kranthi, KR., Wanjari, R. R. 2003. Influence of semilooper damage on cotton host-plant resistance to *Helicoverpa armigera* (Hub). **Plant Science**, 164: 157-163.
- Kranthi. K. R., Russell, D., Wanjari, R. R. Kherde, M., Munje, S. S., Lavhe, N. V & Armes, N. J. 2002. In-season changes in resistance to insecticides in *Helicoverpa armigera* (Lepidoptera: Noctuidae) in India. **Journal of Economic Entomology**, 95: 134-142.
- Kranthi, K. R, Jadhav, D., Kranthi, S., Wanjari, R. R., Ali, S. & Russell, D. 2002. Insecticide resistance in five major insect pests of cotton in India. **Crop Protection**, 21: 449-460.
- Kranthi. K.R., Jadhav, D. R., Wanjari, R. R., Ali, S. and Russell, D. 2001. Carbamate and organophosphate resistance in cotton pests in India, 1995 to 1999. **Bulletin of Entomological Research**. 91: 37-46.
- Kranthi, K. R., Jadhav, D, Wanjari, R. R., Kranthi, S & Russell, D. 2001. Pyrethroid Resistance and Mechanisms of Resistance in Field Strains of *Helicoverpa armigera* (Lepidoptera: Noctuidae). **Journal of Economic Entomology**, 94: 253-263.
- Kranthi, K. R, Kranthi, S and Wanjari, R. R. 2001. Baseline toxicity of Cry1A toxins to *Helicoverpa armigera* (Hubner) (Lepidoptera: Noctuidae). **International journal of pest management**, 47: 141-145.
- Kranthi, K. R & Kranthi, S. 2000 A sensitive bioassay for the detection of Cry1A toxin expression in transgenic cotton. **Biocontrol Science and Technology**, 10: 669-675.
- Kranthi, S., Kranthi, K. R. and Lavhe, N. V. 1999 Baseline toxicity of Cry 1 A toxins to the spotted bollworm, *Earias vittella* F. **Crop protection**. 18, 551-555.
- Kranthi, K. R., Armes, N. J., Rao, N. G. V., Sheo Raj., Sunderamurthy, V. T. 1997 Seasonal dynamics of metabolic mechanisms mediating pyrethroid resistance in *Helicoverpa armigera* in central India. **Pesticide Science**, 50: 91-98

National Journals

- Blaise, D and Kranthi, K. R. 2011. Cry1Ac expression in transgenic *Bt* cotton hybrids is influenced by soil moisture and depth. **Current Science**. 101 (6): 783-788
- Kranthi, K. R., Naidu, S., Dhawad, C. S., Mate, K., Tatwawadi, A., Patil, E., Bharose, A., Behere, GT., Wadaskar, RM. and Kranthi, S. 2005. Temporal and intra-plant variability of Cry1Ac expression in Bt-cotton and its influence on the survival of the cotton bollworm, *Helicoverpa armigera* (Hübner) (Noctuidae: Lepidoptera). **Current Science**, 89: 291-298.
- Kranthi, S. Kranthi, K. R., Bharose, A & S. N. Syed. 2005. A PCR-RFLP tool for differentiating *Helicoverpa armigera* and *Helicoverpa assulta*. **Current Science**, 89:1322-1333
- Kranthi, K. R., Dhawad, C. S., Naidu, S., Mate, K., Patil, E & Kranthi, S. 2005. Bt-cotton seed as a source of *Bacillus thuringiensis* insecticidal Cry1Ac toxin for bioassays to detect and monitor bollworm resistance to Bt cotton. **Current Science**. 88: 796-800
- Kranthi, S., Kranthi, K. R., Siddhabhatti, P. M. and Dhepe, V. R. 2004. Baseline toxicity of Cry1Ac toxin against spotted bollworm, *Earias vittella* (Fab) using a diet based bioassay. **Current Science**. 87: 1593-1597.
- Kranthi, K. R & Kranthi, N. R. 2004. Modelling adaptability of cotton bollworm *Helicoverpa armigera* to Bt-cotton in India. **Current Science**, 87: 1096-1107.
- Kranthi, K. R. Kranthi, S., Ali, S & S. K.Banerjee. 2000 Resistance to Cry1Ac δ -endotoxin of *Bacillus thuringiensis* in a laboratory selected strain of *Helicoverpa armigera* (Hubner). **Current Science**, 78 (8): 1001-1004.
- Kranthi. K. R. 2004. Review of concise encyclopedia of plant pathology. **Current Science**, 87: 1462-1463
- Venugopalan M.V., Kranthi K.R., Blaise D., Lakde Shubhangi and Sankaranarayana K. (2013). High density planting system in cotton. -The Brazil Experience and Indian Initiatives. *Cotton Research Journal, ISCI*. 5(2):172-185.
- Gotmare V., Mohan P., Balasubramani G., Rodge C., Katre M., Tule B.N., Chakrabarty P.K. and Kranthi K. R. (2013) NISC 40(IC0584261; INGR13033), NISC 40(IC0584262; INGR13034), NISC 40(IC0584262; INGR13035) (2013) Jassid Tolerant Compact Plant Type Introgressed derivatives of Cotton. *Indian Journal of Plant Genetic Resources* Vol 26 No 3 pp253 – 254.
- Gotmare V., Mohan P., Balasubramani G., Waghmare V.N., Rodge C., Katre M., Tule B.N., Chakrabarty P.K. and Kranthi K.R. (2013) Vaidehi 95 (MSH 53) (IC0584260; INGR13032) Dark Brown Linted Introgressed Derivative of Cotton. *Indian Journal of Plant Genetic Resources* Vol 26 No 3 pp252-253.
- Kranthi K.R. 2013. The Story of American bollworm. Pp 1-4, Cotton Statistics and News
-Vol-11, Published by Cotton Association of India, Mumbai
- Kranthi K.R. 2013. Cotton Shirt as Strong as Steel? CAI-Vol-15-Cotton Statistics and News, Published by Cotton Association of India, Mumbai
- Kranthi K.R. 2013. Long Live Swadesi Cotton CAI-Vol-20-Cotton Statistics and News, Published by Cotton Association of India, Mumbai
- Kranthi K.R. 2013. How India Can Double the National Average Cotton Yield CAI-Vol-24-Cotton Statistics and News, Published by Cotton Association of India, Mumbai
- Kranthi K.R. 2013. Testing Seed Quality of Bt cotton CAI-Vol-29-Cotton Statistics and News, Published by Cotton Association of India, Mumbai
- Kranthi K.R. 2013. The Organic Cotton Argument CAI-Vol 32-Cotton Statistics and News, Published by Cotton Association of India, Mumbai
- Kranthi K.R. 2013. Impact of Bt cotton in India CAI-Vol 36-Cotton Statistics and News, Published by Cotton Association of India, Mumbai
- Kranthi K.R. 2013. Need for a change in cotton R&D policies CAI-Vol 40- Cotton Statistics and News, Published by Cotton Association of India, Mumbai
- Kranthi K.R. 2014. Insect War in Cotton Battle Fields CAI-Vol 44-Cotton Statistics and News, Published by Cotton Association of India, Mumbai
- Kranthi K.R. 2014. The Road Blocks to Genetically modified crops in India CAI-Vol 50- Cotton Statistics and News, Published by Cotton Association of India, Mumbai

- Kranthi K.R. 2014. How Colourful is the Future of Naturally Coloured Cotton? CAI-Vol 1 Cotton Statistics and News, Published by Cotton Association of India, Mumbai
- Kranthi K.R. 2014. Cotton Leaf Curl Virus Time Bomb CAI-Vol 4 Cotton Statistics and News, Published by Cotton Association of India, Mumbai
- Kranthi K.R. 2014. Cotton in the Climate Trap CAI-Vol 10 Cotton Statistics and News, Published by Cotton Association of India, Mumbai
- Vennila, S., A.J. Deshmukh, D.Pinjarkar, M.Agarwal, V.V.Ramamurthy, S.Joshi, K.R.Kranthi and O.M.Bambawale. 2010. Biology of mealybug, *Phenacoccus solenopsis* on cotton in Central India. **Journal of insect science** 10:119 available online: insectscience.org/10.119.
- Kranthi, S., Kranthi, K. R. Bharose, A. A. Syed, S. N., Dhawad, C. S Wadaskar, R. M Behere G. T and Patil E. K. 2006. Cytochrome oxidase I sequence of *Helicoverpa* sps in India- its utility as a molecular tool. **Indian Journal of Biotechnology**, **5**
- Russell, D. A and Kranthi, K. R. 2006. Global status of Insecticide Resistance Mechanisms in the Cotton Bollworm *Helicoverpa armigera*. **J. Indian Soc. Cotton Improv.** 119-128.
- Kranthi, K.R., Kranthi,S and K.S.Mohan. 2001. Potential of Mango leaf extract containing flavonoids as UV protectants against inactivation of *Helicoverpa armigera* NPV. **Journal of Entomological research**, 25(2)155-160.
- Kranthi,K. R., Kranthi, S., Dongre, A. B and Kairon, M. S . 2000. A brief review on transgenic cotton. **Journal of the Indian society for cotton Improvement**, **4**, 1-16.

Book Chapters

- Rajinder Peshin, Keshav R. Kranthi and Rakesh Sharma. 2014. Pesticide Use and Experiences with Integrated Pest Management Programs and Bt Cotton in India. Chapter 11. Pp. 269-306. R. Peshin, D. Pimentel (eds.), Integrated Pest Management. DOI 10.1007/978-94-007-7802-3_11, © Springer Science+Business Media Dordrecht 2014
- Kranthi, K. R. and Manickam, S 2012. Cotton (*Gossypium hirsutum* L.). Chapter 23, pp 591-629. in D. N. Bharadwaj, *Breeding of Field Crops*, AgroBios India. 2012
- Kranthi, K. R. and Russell, D. 2009. Changing trends in Cotton Pest Management. Chapter 17, pp 499-541. in R. Peshin, A.K. Dhawan (eds.), *Integrated Pest Management: Innovation-Development Process*, C_ Springer Science+Business. 2009
- Kranthi, K. R., Jadhav, D. R., Kranthi, S. and D. A. Russell. 2005. Insecticide resistance management strategies for *Helicoverpa*. Pp 405-430. **Helicoverpa management**. (Eds. Sharma H. C.). Published by Oxford IBH Publishing Company Pvt. Ltd. New Delhi. India.
- Kranthi, K. R. 2005. Managing *Helicoverpa armigera* resistance to insecticides. Pp. 355-376 **Frontier Areas of Entomological Research**. (Eds. B. Subrahmanyam, V. V. Ramamurthy & V. S. Singh). Published by IARI at Golden Printers & Publishers, New Delhi.
- Mayee, C. D and Kranthi K. R. 2008. Four years of a commercial transgenic crop in India: future prospects of biotech agriculture. Chapter 21. Pp 460-496 In. **Agriculture for food security and rural growth**. (Ed. Vibha Dhawan) Published by TERI Press, New Delhi
- Kranthi,S., Kranthi, K. R & Sheoraj. 2005. Host plant resistance in cotton. Pp. 113-128. **Gleanings in Entomology**. (Eds. V. V. Ramamurthy; V. S. Singh; G. P. Gupta & A. V. N. Paul). Published by IARI at Golden Printers & Publishers, New Delhi.

Externally Funded Projects

- Principal Investigator:** "Dissemination of IRM-HDPS strategies in India" (Rs 4 crores -approx) Funded by Ministry of Agriculture, Government of India. National Food Security Mission (2014-17).
- Principal Investigator:** "Dissemination of IRM strategies in India" (Rs 9.5 crores) Funded by Ministry of Agriculture, Government of India. Technology Mission on cotton MM-II (2002-14).
- Principal Investigator:** "Identification of species specific dsRNA or siRNAs or miRNAs in cotton insect pests to explore their use in pest management through RNAi based technologies" DBT project. 2010-2013. (Rs 49 lakhs)

Principal Investigator: “Novel approaches for production of hybrid seeds with characteristics of improved insect resistance and higher yield” Funded by the CSIR, under the New Millennium Initiative project. 2007-2012. (Rs 98.0 Lakhs)

Principal Investigator: “Sustainability of pyramided Bt genes in crop plants for insect control” Funded by Department of Biotechnology, Ministry of Science & Technology. Government of India. No. BT/PR11333/ICD /55/08/2008. (No. DBT/Indo-Aus/02/44/07) 2008-2011 (Rs 38.61 lakhs)

Principal Investigator: “Emerging and key pests: their characterization, taxonomy, genetic diversity and control” Funded by the Ministry of Agriculture, Government of India. 2006-2008 under Technology Mission on Cotton. 2006-2012. (Rs 110.0 lakhs).

Principal Investigator: “*H. armigera* response to Rynaxypyr” (Rs 10 lakhs). DuPont, India. (2006-09).

Principal Investigator: “Resistance to Bt-cotton in the cotton bollworm *Helicoverpa armigera* detection, monitoring and development of new diagnostic tools and management strategies” (Rs 98,00,000) Funded by ICAR, New Delhi. (2004-08).

Principal investigator (India): “Sustainable control of the cotton bollworm, *Helicoverpa armigera*, in small scale production systems” (US \$ 3,000,000) Funded by the CFC, Netherlands. (2000-2005).

Principal investigator (India): “Insecticide resistance monitoring of *Helicoverpa armigera*” -an international collaborated project (US \$ 52,000) funded by The Natural Resources Institute, UK, at CICR, Nagpur. Project duration 1993-1996 (Phase-1).

Principal investigator: “Insecticide resistance management of *Helicoverpa armigera*” -an international collaborated project (US \$ 68,000) funded by The DFID, United Kingdom, at CICR, Nagpur. Project duration 1996-1999 (Phase-II).

Principal Investigator: Biochemical, Molecular and Ecological studies on resistance in cotton bollworms to Cry1Ac. (2002-2005. Rs 16,70,000). Funded by Department of Biotechnology, Govt of India. Ministry of Science & Technology.

Principal investigator: “Studies on biochemical rationale of synergism between deltamethrin and triazophos” (Rs 4,00,000) (2002-2003) funded by Aventis Biosciences, India.

Principal investigator: “Biochemical and ecological factors influencing the susceptibility of *Helicoverpa* resistance to Novaluron. (Rs 500,000) (2003-2004) Funded by Indofil Ltd.

Principal investigator: “Laboratory studies on ovicidal effect and *Helicoverpa* resistance development with Spinosad, Chlorpyrifos, Spinosad + Chlorpyrifos combination (Rs 500,000) (1998-2000) Funded by De-Nocil crop protection Ltd.

Co-Principal Investigator: “Development of farmer friendly diagnostic kits for transgenic event seed purity”. Funded by the Ministry of Agriculture, Government of India. 2006-2008 under Technology Mission on Cotton. 2006-2012. (Rs 55.0 lakhs).

Co-Principal Investigator: Studies on development of resistance in cotton bollworms to Cry1Ac. 2002-2010. Rs 20,00,000. Funded by Mahyco India Ltd.

Co-Principal Investigator: Studies on development of resistance in cotton bollworms to Cry2Ab and Bollgard-II. 2002-2010. Rs 15,00,000. Funded by Mahyco India Ltd.

Co-Principal Investigator: Studies on development of resistance in cotton bollworms to Cry1Ac. 2006-2010. Rs 10,00,000. Funded by JK Seeds India Ltd.

Co-Principal Investigator: “Development of Technology for Detecting Presence of GMOs in unknown Sample and utilization in dealing with Bulk Samples” (Rs 73.0 lakhs) Sponsored by the Ministry of Agriculture, Government of India. 2006-2009.

Co-Principal investigator: “Area wide farmer participatory IRM strategies for the management of *Helicoverpa armigera*” (Rs 15,00,000) (1999-2001) Funded by the ICAR cess-fund Programme.

Investigator: “Basic studies on Cotton Integrated pest management” (Rs 4,400,000)(1993-1996), funded by the World Bank under National Agricultural Research Programme.