

Résumé of Dr. Sanjay Kumar Singh



1. Personal Details

Name	:	Sanjay Kumar Singh
Designation & Discipline	:	Scientist (Horticulture: Fruit Sciences)
Correspondence address (preferably official)	:	ICAR-National Research Centre on Litchi Mushahari Farm, Muzaffarpur
City	:	Muzaffarpur
Pin	:	842 002
Phone	:	0621-2281160, 2289475
Fax	:	0621 228 1162
E-mail	:	sanjayhor@rediffmail.com
Mobile	:	+91-9546891510, 9044365772

2. Qualifications (Highest degree)

Degrees	Year	Institute	Subject (Specialization)
Ph.D.	2007	IARI, Pusa, New Delhi - 110 012	Horticulture (Pomology)
M.Sc.	2004	G. B. Pant University of Agriculture and Technology, Pantnagar – 263145 (Uttarakhand)	Horticulture
B.Sc.	2002	Institute of Agricultural Science, BHU, Varanasi - 221 005	Agriculture

3. Research Projects (Ongoing/Completed projects)

Details such as Title, PI/Co-PI, Fund Allocation, Duration etc.	Salient accomplishment /Activities underway
<p>Institute Project: “Standardization of maturity standards, harvesting and post harvest handling techniques for litchi fruits” As PI (project started from 1st May 2011 and handled till March, 2014) 54.00 lakhs Duration : 5 years</p>	<ul style="list-style-type: none"> ❖ Review of literature and formulation of project based on the gaps identified ❖ The research activities is started with objective of what should be maturity indices for litchi harvesting, how pericarp browning can be prevented and what are expected biochemical changes of litchi fruits during maturity and ripening, how grading and packaging should be done to enhance the self life and storage life etc. This project shows the door for designing of packaging and storage technologies to prevent physical/chemical damage of produce and also for easy handling while transportation to distantly located consumer market.
<p>Institute Project : “Investigation and establishing the physiological and biochemical relations for improved litchi production” As Co-PI (project started from 1st May 2011) 66.00 lakhs</p>	<ul style="list-style-type: none"> ❖ Review of literature and formulation of project based on the gaps identified. ❖ The research activities started with objective of how vegetative flushing and shoot maturity affect flowering, bearing behaviour, fruit yield and quality in litchi. This project also envisage bringing advancement/or delay in flowering of litchi and an attempt is also being made to have regularity in bearing litchi cv. China. ❖ Trees was treated (sprayed) with <i>paclobutrazol/Potassium nitrate/prohexadione-Ca</i> for bringing regularity of flowering including advancement or delay in flowering as well as post flowering physiological behaviour in relation to yield and quality of litchi.
<p>Flagship Project–2: “Shoot physiology in relation to flowering and fruiting in litchi” as Principal Investigator (Started in April, 2014 for 3 years) 125.20 lakhs,</p>	<ul style="list-style-type: none"> ❖ Information on changes in biochemical constituents in shoots like carbohydrates, phenols, prolines, various enzymes, soluble proteins and amino acids in relation to flushing and panicle initiation would help in developing a proper understanding of the panicle initiation process in litchi. ❖ Flushes can be predicted for flowering based on physio-biochemical constituents of shoots, net photosynthesis rate, transpiration rate and shoot maturity indices including stress physiology. The shoots can be evaluated for various factors that might involve in flowering process and suitable intervention may be applied for floral initiation for improved production. ❖ The investigation is leading towards determination of shoot maturity, morphology, physiology and biochemistry responsible for flowering or remain-in-vegetative phase and subsequent shoot or flower formation.
<p>UNEP-GEF Project: “Conservation and Sustainable use of Cultivated and Wild Tropical Fruit Diversity: Promoting Sustainable Livelihoods, Food Security and Ecosystem Services”, As Site Co-ordinator, Pusa Site (Started working in 2012 and handled till March, 2015) Approx. 45.00 Lakhs</p>	<ul style="list-style-type: none"> ❖ The duly filled proforma of Farmer’s Variety on mango (16 in No.) and Pummelo (10 in No.) identified at Pusa Site, Bihar has been submitted to PPV&FRA, New Delhi. ❖ Profile of 12 custodian farmers have been published, 13 germplasm of Pummelo, 16 of mango is being characterized at IIHR Bangalore. ❖ Four Community nurseries (<i>Jagdishpur, Bhuskaul, Mahamada and Dighra</i> community) was established using shade nets, seven diversity plots containing local varieties of TFTs has been established at five places. ❖ 380 plants of mango and 80 plants of pummelo was distributed to 30 farmers of the 5 community. ❖ 3,000 Pummelo fruits were sold in the <i>Secunderabad/Hyderabad</i> market by members of two SHGs of <i>Malinagar</i> community. ❖ Inputs for pickle making was given to 3 women SHGs. 96 kg of 3 types

	<p>(wet, dry and mixed) of <i>Mango</i> pickles prepared by four self help groups (SHGs) has been promoted as a premier product.</p> <ul style="list-style-type: none"> ❖ 40 SHGs was formed for mango/ pummelo conservation and its value addition. Each SHG has own CBM funds, microcredit to SHGs was facilitated through DHAN Foundation. ❖ Three TKs (Traditional Knowledge) was documented as '<i>Conservation of pummelo in home stead through Chhat Puja</i>', '<i>Multi fruits home stead garden</i>' and '<i>Multi-variety mango orchard</i>'. ❖ One hundred notebook sets were printed for maintaining accounts and registers of SHGs. ❖ Two number of 15 min documentary [video films] (one each in English and Hindi) was made on '<i>Project accomplishment of various activities of Pusa site</i>' including indigenous methods of pickle preparation by the women SHGs. ❖ 8 custodian farmers visited IIHR, Bangalore, College of Forestry, Sirsi, KA and Chittoor Site, AP, 2 to BAU Sabour, Bhagalpur and 4 to CISH, Lucknow. ❖ Ex-post survey was completed in all five communities with survey and Focussed Group Discussion (FGD) through four cell analysis (FCA) and MSC (most significant changes).
<p>Department of Biotechnology, Govt. of India Sponsored project: "Development of National Database on Mango" Working as Co-PI (Project started in April, 2013 for 3 years) 26.95 lakhs</p>	<ul style="list-style-type: none"> ❖ Data recorded on mango germplasm maintained and conserved by ICAR Institutes, SAUs, KVKs located in Bihar and Jharkhand. ❖ Among 86 farmers of 21 blocks of seven districts of Bihar (<i>Darbhangha, Gopalganj Madhubani, Muzaffarpur, Samastipur, West Champaran and Vaishali</i>), the maximum varieties of mango is grown and maintained by Sri. Vinod Kumar Rai of <i>Jagdishpur</i>, Samastipur (36 in No.) and Sri Abdul Rahim of <i>Kumarbagh</i>, West Champaran (28 in No.). ❖ Sri Vijay Kumar Sharma of <i>Basuari</i>, Samastipur is maintaining 20 and Sri. Wasi Akhtar of <i>Dharmparsa</i>, Gopalganj, Sri. Harsh Ranjan of <i>Hasanpur Vajhi</i>, Muzaffarpur and Sanjay Sharma of <i>Malinagar</i>, Samastipur are having 19 varieties each in their orchard. ❖ Till date we got maximum number of orchardists (25 in No.) from Darbhanga district having more than 10 varieties in their orchard, 13 orchardists, have more than 15 varieties in their orchard. ❖ <i>Darbhangha, Samastipur, Muzaffarpur, East Champaran, Vaishali, Bhagalpur, Khagaria and West Champaran</i> is the main mango producer districts of Bihar.
<p>NAIP sponsored e-GRANTH project: Strengthening of Digital Library and Information Management under NARS As CCPI (Handled from April, 2013-March, 2014) 14.33Lakhs</p>	<ul style="list-style-type: none"> ❖ <i>Debian 7.3.1</i> and <i>Koha LS 3.14</i> has been installed and customization of KOHA-OPAC was completed. Standalone Server (Proliant ML 350 G6) from M/s Techlan, M. G. Road, Harideopur, Kolkata, is installed at the centre. ❖ Data entered against Books (1675 + 10 Statistical CDs) and Journals (1105 in No.) of NRCL Library was taken for Centralized Koha Implementation at IARI, New Delhi.

4. Publications (Mainly Research Articles and Technical Bulletins)

Research Papers:

- Panwar, Rashmi, **Singh, Sanjay Kumar.**, Singh, C.P. and Singh, P.K. (2007). Mango fruit yield and quality improvement through fertigation along with mulch. *Indian Journal of Agricultural Sciences*, **77**(10):680-684
- Singh, Sanjay K.**, Singh, C.P. and Panwar, R. (2009). Response of fertigation and plastic mulch on growth characteristics of young 'Dashehari' mango. *Indian Journal of Horticulture*, **66**(3):390-392
- Singh, Sanjay Kumar**, Singh. S.K., Sharma, R.R. and Srivastav, M. (2009). 'Effect of pruning on morpho-physiological parameters and microclimate under high density planting of mango (*Mangifera indica* L.) *Indian Journal of*

- Singh, Sanjay Kumar.**, Singh, S.K. and Sharma, R.R. (2009). Endogenous phytohormones after pruning in three mango cultivars planted under high density. *Indian Journal of Plant Physiology*, **14**(4):392-396
- Singh, Sanjay Kr.**, Singh, S.K., Srivastav, M., Sharma, R.R. and Patel, V.B. (2010). Influence of pruning intensities on leaf nutrient composition in some mango (*Mangifera indica* L.) cultivars planted under high density. *Indian Journal of Horticulture*, **67**(1):16-20
- Singh, Sanjay Kumar.**, Singh, Sanjay Kumar and Sharma, Ram Roshan. (2010). Effects of pruning intensity on the biochemical status of shoot buds in three different mango (*Mangifera indica* L.) cultivars planted at high density. *Journal of Horticultural Science & Biotechnology*, **85** (6): 483–490).
- Singh, Sanjay Kumar**, Singh, S.K and Sharma, R. R. (2010). Pruning alters fruit quality of mango cultivars (*Mangifera indica* L.) under high density planting. *Journal of Tropical Agriculture*. **48** (1–2): 55–57, 2010
- Singh, Sanjay Kumar.**, Singh, S.K., Sharma, R.R. and Patel, V.B. (2010). Influence of pruning intensity on flowering, fruit yields and floral malformation in three mango cultivars planted under high density. *Indian J. Hort.* **67**(Special Issue): 84-89
- Singh, Sanjay Kumar.**, Singh, S.K. (2010) Effect of pruning intensities on leaf tissue micronutrient status in three mango (*Mangifera indica* L.) cultivars planted under high density. *Journal of Horticultural Science*. **5** (2):37-41
- Singh Sanjay Kumar** and Bhargava, R. (2011). Evaluation of mango genotypes for morpho-physiological attributes under hot-arid zone of Rajasthan. *Journal of Tropical Agriculture*. **49** (1–2): 104–106
- Singh, Sanjay Kumar**, Singh, R.S. and Awasthi, O.P. (2013). Influence of pre- and post-harvest treatments on shelf-life and quality attributes of *ber* fruits. *Indian Journal Horticulture*, **70** (4): 610-614.
- Singh, Sanjay Kumar**, Singh, Awtar, Nath Vishal, Parthasarathy, V A, Sthapit B, Rajan, S and Vinoth, S. (2015). Genetic Diversity in Seedling Populations of Mango. *Indian J. Plant Genet. Resour.* **28**(1): 123-131
- Singh, Sanjay Kumar**, Singh, Awtar, Nath Vishal, Parthasarathy, V. A., Sthapit B. and Vinoth, S. (2015). Pummelo in Homestead Garden: Conservation through Family Farming. *Indian J. Plant Genet. Resour.* **28**(1): 132-138
- Singh, Sanjay Kumar**, Singh, I.P., Singh, Awtar, Parthasarathy, V A. and Vinoth, S. (2015). Pummelo [*Citrus grandis* (L.) Osbeck] Diversity in India. *Indian J. Plant Genet. Resour.* **28**(1): 44-49
- Gajanana, TM, Dinesh, MR, Rajan, S, Vasudeva, R, **Singh, Sanjay Kumar**, Lamers, Hugo AH, Parthasarathy, VA Sthapit, B and V Ramanatha Rao (2015). Motivation for On-farm Conservation of Mango (*Mangifera indica*) Diversity in India: A Case Study. *Indian J. Plant Genet. Resour.* **28**(1):1-6
- Vasudeva R, Sthapit B, Salma I, Changtragoon S, Arsanti IW, Gerten D, Dum-ampai, N, Rajan, S, Dinesh, MR, Singh, IP, **Singh, Sanjay Kumar**, Reddy, BMC, Parthasarathy, VA and V Ramanatha Rao (2015). Use Values and Cultural Importance of Major Tropical Fruit Trees: An Analysis from 24 Village Sites Across South and South East Asia. *Indian J. Plant Genet. Resour.* **28**(1):17-30
- Gajanana, TM, Rajan, S, Singh, IP, Dinesh, MR, Vasudeva R, **Singh, Sanjay Kumar**, Lamers, Hugo, Parthasarathy, VA, Sthapit, B and Ramanatha Rao V. (2015). Fruit Diversity Fair and On-farm Conservation: An Indian Experience. *Indian J. Plant Genet. Resour.* **28**(1): 80-86
- Dinesh, MR, Rajan S, **Singh, Sanjay Kumar**, Singh IP, Ravishankar, KV, Reddy, BMC, Parthasarathy, VA, Sthapit B., Ramanatha Rao V and BS Sandya (2015). Heirloom/ Seedling Mango Varieties of India: Potentialities and Future. *Indian J. Plant Genet. Resour.* **28**(1):139-151

Technical Bulletins:

- Singh, G., Nath, V., Purbey S. K., Pal, R. K. and **Singh, Sanjay Kumar** (2011). Post Harvest Management and Valorization of Litchi. ICAR-National Research Centre for Litchi, Muzaffarpur 842 002, Bihar, सिंह, गोरख, वशाल नाथ, संजय कुमार सिंह, सुशील कुमार पूर्बे एवं राम कृष्ण पाल (2011). लीची फलो का तुराई उपरान्त प्रबन्धन एवं मूल्य संबर्द्धन. एफ. ए. ओ. वत पो षत, राष्ट्रीय लीची अनुसंधान केंद्र, मुशहरी, मुजफ्फरपुर, बिहार, **1-26pp**
- Singh Awtar, **Singh, Sanjay Kumar** and Nath Vishal (2013). Community Fruit Catalogue on Mango (*Mangifera indica* L.). NRCL-FC-01, ICAR-National Research Centre on Litchi, Muzaffarpur, Bihar. India. 1-25 pp.
- Singh Awtar, **Singh, Sanjay Kumar** and Nath Vishal (2013). Community Fruit Catalogue on Pummelo (*Citrus grandis* Osbeck). NRCL-FC-02, ICAR-National Research Centre on Litchi, Muzaffarpur, Bihar. India, 1-21 pp.
- Singh, Awtar; Nath, Vishal; **Singh, Sanjay Kumar**; Reddy, B.M.C. and Sthapit, Bhuwan (2013). 'Uses and Health Benefits of Pummelo (*Citrus grandis* Osbeck)'. NRCL-EB-12, ICAR-National Research Centre on Litchi, Muzaffarpur, Bihar, India, 1-12 pp.

- सिंह, अवतार, सिंह, संजय कुमार और विशाल नाथ, (2014). आम का सामुदायिक फल कैटलॉग, फल कैटलॉग संख्या: 03, भाकृअनुप- राष्ट्रीय लीची अनुसंधान केंद्र, मुशहरी, मुज़फ़्फ़रपुर 842 002, 1-24 pp
- सिंह, अवतार, सिंह, संजय कुमार और विशाल नाथ, (2014). गागर नींबू का सामुदायिक फल कैटलॉग, फल कैटलॉग संख्या: 04, भाकृअनुप- राष्ट्रीय लीची अनुसंधान केंद्र, मुशहरी, मुज़फ़्फ़रपुर 842 002, 1-24 pp
- सिंह, अवतार, विशाल नाथ, सिंह, संजय कुमार, रेड्डी बी एम सी और भुवन, स्थापित (2014).). गागर नींबू के स्वास्थ्य बर्धक गुण एवं उपयोग. प्रसार पुस्तिका संख्या:13, भाकृअनुप- राष्ट्रीय लीची अनुसंधान केंद्र, मुशहरी, मुज़फ़्फ़रपुर 842 002, 1-16 pp
- Rajan, S., Dinesh, M.R., Ravishnkar, K.V., Bajpayee, A., Ahmed, I., Singh, Awtar, **Singh, Sanjay Kumar**, Singh, I.P., Vasudeva, R., Reddy, BMC, Parthasarathy, V. A. and Sthapit B. (2014). Heirloom Varieties of Important Tropical Fruits: A Community Initiative to Conservation., *ICAR-Indian Institute of Horticultural Research*, Bangalore 560 089, 1-33 pp
- Singh, Sanjay Kumar**, Singh, Awtar, Vishal Nath and Lal, Narayan (2014). Custodian of Mango Diversity: A case study of Pusa, Bihar. NRCL-TB-010: *ICAR-National Research Centre on Litchi*, Muzaffarpur. 1-50pp
- सिंह, संजय कुमार, पाण्डेय, शशधर, नारायण लाल और विशाल नाथ, (2014). आम के बगीचे में उत्तम कृषि क्रियाएँ., प्रसार पुस्तिका संख्या:15, भाकृअनुप- राष्ट्रीय लीची अनुसंधान केंद्र, मुशहरी, मुज़फ़्फ़रपुर 842 002, 1-40 pp
- Singh, Sanjay Kumar**, Srivastav, K, Lal, N and Vishal Nath (2014). Management of Hoppers, Mealy bug and Fruit fly in Mango orchard. NRCL-Extension Bulletin-14, *ICAR-National Research Centre on Litchi*, Muzaffarpur. 1-7pp
- Singh, Sanjay Kumar**, Singh, Awtar, Lal, N. and Vishal Nath (2014). Indigenous Methods of Pickle making from mango fruits at Pusa, Bihar. NRCL-Extension Folder-01, *ICAR-National Research Centre on Litchi*, Muzaffarpur: 1-6 pp.
- सिंह, संजय कुमार, कुमारी, अरुणमा और नारायण लाल, (2014). आम के कच्चे एवं पके फलों से उत्पाद बनाने के घरेलू तरीके. NRCL-Extension Folder-01, *ICAR-National Research Centre on Litchi*, Muzaffarpur. 1-4pp.

5. Important Research Contributions in Brief

- ❖ Combination of fertilizers applied through fertigation + mulching for young ‘Dashehari’ mango resulted better tree growth which give improved yield with quality fruits.
- ❖ Moderate pruning had profound effects on the biochemical status (shoot bud proline contents reduced and total chlorophyll, chlorophyll b contents were enhanced) in mango trees which, in turn, had a direct influence on the vegetative growth and flowering parameters.
- ❖ Pruning at appropriate time may be helpful to induced flowering during off season (moderate pruning enhanced IAA content and reduced GA₃ in mango shoot buds; congenial for flowering).
- ❖ Canopy microclimate in mango drastically improved after pruning. Pruning reduced transpiration rate but increase light penetration, canopy temperature, net photosynthetic rate.
- ❖ Mild pruning (60cm from apex) is a beneficial practice to maintain high density orchards in mango for sustainable production and maximum yield of better quality fruits in terms of pulp: stone ratio, TSS, and total carotenoid contents.
- ❖ Major nutrients (primary and secondary) reduced during flowering, while during ‘on’ year the N, P and Ca levels increased.
- ❖ Severe pruning (90 cm from apex) in old mango trees may be advisable to improve micronutrient status in floral and non floral shoots.
- ❖ Mango cultivar ‘Kesar’ followed by ‘Amrapali’ and ‘Rajapuri’ and ‘Guava cultivar ‘Sweta’ ‘Lalit’ and ‘Allahabad Safeda’ may perform better under hot-arid environment in initial year of establishment of orchard with better growth and physiological adaptation.
- ❖ The pre-harvest spray of CaCl₂ (0.4%) + Boric acid (1.0%) coupled with completely packed poly bags (Ziplocked with pinhead holes) is able to prolong shelf life of Ber fruits with better quality parameters.
- ❖ Non-floral shoots of ‘Shahi’ and ‘China’ litchi has reduced content of reducing sugar, total sugar, *Chl a*, *Chl b* and *Total Chl* than floral shoots. The total phenol content of non-floral shoots exceeds over floral shoots.
- ❖ Application of 2.0 and 4.0 g PBZ advanced color turning by 5 days. TSS (17.74 °B) and average fruit weight (21.97 g) was improved due to spray of 4.0 g PBZ.
- ❖ Spray of 3.0 and 4.0 g PBZ encouraged cauliflorous growth in the trees and reduces leaf area. Application of 3.0 g PBZ led to reduction in leaf area, *Chl b*, *total chlorophyll content*, reducing sugar and total phenol content. Spray

of 2.0 % KNO₃ increased maximum reducing sugar content in the leaves.

- ❖ A very late- maturing mango seedling (Clone 77) from *Bhuskaul* village of Samastipur, Bihar was identified.
- ❖ *Debian 7.3.1* and *Koha LS 3.14* has been installed and customization of KOHA-OPAC was completed at NRCL Library.
- ❖ 16 germplams of mango and 13 of pummelo were morphologically characterised and listed in fruit catalogue published at the centre.
- ❖ 8-mango germplasm were characterized based on ISSR markers.

6. Membership of Professional Societies

- Life member of Horticultural Society of India, New Delhi since 2005.