

Research Center for Makhana, Darbhanga

Personal Details



Dr. Indu Shekhar Singh
PS & I/c Head

Address : Flat No. 201 'B', Luv-Kush Apartment, Sidharth Nagar, Lohiya Path, Jagdeo Path, Bailey Road, Patna-800014

Email-ID: induciah@rediffmail.com

Research Interest

Soil Science: Soil Chemistry/Soil Fertility/Soil Microbiology; Management of Waterlogged Soil; Aquatic Crop Management

Research Highlights

Soil chemistry and fertility of submerged soils, nature and properties of wetlands, cropping of aquatic crops, dynamics of nutrients (nutrient budgeting) of aquatic crops, nursery preparation of makhana, water chestnut and Indian Lotus; scientific cultivation technologies of makhana, water chestnut and Indian Lotus.

Memberships / Fellowships

Technology Developed

- The techniques of nursery preparation of Makhana crop
- Field based Makhana cultivation
- Introduction of Makhana based integrated farming system model
- Development of Makhana Popping Machine.
- Makhana cultivation in cropping system mode.
- Development of need based Integrated Farming System Model of makhana production (Pond & Field ecosystem).
- Sequential double cropping systems of Makhana (*Euryale ferox* Salisb.) cultivation in agricultural fields of north Bihar, India.
- Dynamics of nutrients under makhana and makhana-based cropping systems grown in *Inceptisols* of northern Bihar.
- Integrated nutrient management in makhana.

Publication Details

Research articles (International Journals):

1. Bhatt, B.P., Gupta, V.K., Kumar, Lokendra, **Singh, Indu Shekhar** and Sarkar, Bikas (2017) *Euryale ferox* (Salisb.) Promising aquatic food crop of eastern Indo Gangetic plains. *International Journal of Current Microbiology and Applied Sciences*, **6 (6)**: 1914-1921.
2. Kumar Nitish, Shikha, Divya, Kumari, Swati, Choudhary, B.K., Kumar, Lokendra and **Singh, Indu Shekhar** (2017) SSR-Based DNA fingerprinting and diversity assessment among Indian germplasm of *Euryale ferox*: An Aquatic Underutilized and Neglected Food Crop. *Applied Biochemistry and Biotechnology*, <http://doi.org/10.1007/s12010-017-2643-9>.
3. Kumar, Amit, **Singh, I.S.**, Kumar, R., Jha, V.N., Thakur, A.K. and Kumar, Anil (2017) Fruit production and biochemical aspects of seeds of *Euryale ferox* Salisb. under ex-situ Conditions. *HortFlora Research Spectrum*, **6(2)**: 122-124.
4. Kumar, Amit, **Singh, I.S.**, Thakur, A.K., Choudhary, A.K., Jha, Vidyanath, Singh, S.P., Prasad, S.S, Yadav, Pankaj and Kumar, Ramesh (2017) Bioaccumulation of plant nutrients by *Euryale ferox* salisb. Growing in field condition in Northern Bihar of North India. *International Journal of Current Microbiology and Applied Sciences*, **6 (7)**: 1229-1237.
5. Kumar, Hemant, Priya, Priti, Singh, Nena, Kumar, Mukesh, Choudhary, Binod Kumar, Kumar, Lokendra, **Singh, Indu Shekhar** and Kumar, Nitish (2016) RAPD and ISSR Marker-based comparative evaluation of genetic diversity among Indian germplasms of *Euryale ferox*: an Aquatic Food Plant. *Applied Biochemistry and Biotechnology*, **DOI 10.1007/s12010-016-2171-z**.
6. Kumar, Lokendra, Gupta, V.K., **Singh, I.S.**, Bhatt, B.P. and Kumar, Devender. (2014) Sequential double cropping system of makhana (*Euryale ferox* Salisb.) in agricultural fields of north Bihar. *International Journal of Agricultural and Statistical Sciences*, **10**: 105-108.
7. Kumar, Nitish, Rani, Shweta, Kumar, Gaurav, Kumari, Swati, **Singh, Indu Shekhar**, Gautam, S. and Choudhary, B.K. (2018) Physiological and

- biochemical responses of Makhana (*Euryale ferox*) to gamma irradiation. *Journal of Biological Physics*, 44(3): 459-470. (<https://doi.org/10.1007/s10867-018-9511-x>).
8. Kumar, Ramesh, Ahmad, Javed, Abdin, M.Z., Jha, V.N., Kumar, Amit and **Singh, I.S.** (2017) Optimization of seed germination in Makhana (*Euryale ferox* Salisb.) under controlled conditions. *HortFlora Research Spectrum*, **6(1)**: 55-58.
 9. Kumari, Uma Mahto, Azma Saheen, Kumari, Swati, **Singh, Indu Shekhar** and Kumar, Nitish (2018) DNA polymorphism analysis of Indian germplasms of *Trapa natans* using RAPD molecular Marker. *Biocatalysis and Agricultural Biotechnology*, **15**: 146-149. (<https://doi.org/10.1016/j.bcab.2018.06.001>).
 10. **Singh, I.S.** (2017) Dynamics of nutrients of aquatic crop (Gorgon nut or Makhana) under different systems of cultivation-A review. *International Journal of Agricultural Sciences*, **7 (5)**: 1309-1316.
 11. **Singh, I.S.**, Kumar, Lokendra, Bhatt, B.P., Thakur, A.K., Choudhary, A.K. and Kumar, Anil (2017) Integrated Aquaculture with Fox Nut- A Case Study from North Bihar, India. *International Journal of Current Microbiology and Applied Sciences*, **6 (10)**: 4906-4912.
 12. **Singh, I.S.**, Kumar, Lokendra, Singh, A.K., Bhatt, B.P. and Singh, S.P. (2014) Impact of makhana, (*Euryale ferox* Salisb.) based cropping systems on nutrient dynamics of inceptisols of north Bihar. *International Journal of Agricultural and Statistical Sciences*, **10**: 125-129.
 13. Thakur, A.K., Kumar, Ramesh, Shambhu, Vidya Bhushan and **Singh, Indu Shekhar** (2017) Effectiveness of Shrink-wrap Packaging on Extending the Shelf-life of Apple. *International Journal of Current Microbiology and Applied Sciences*, **6 (12)**: 2365-2374.
 14. Yadav, P.K., Singh, A.P., Raha, P. and **Singh, I.S.** (2016) Integrated nutrient management of wheat under reduced tillage in rice-wheat cropping system and soil properties. *African Journal of Agricultural Science and Technology*, **4(4)**: 677-682.

National Journals:

1. Arya, R., Awasthi, O.P., Singh, Jitendra, **Singh, I.S.** and Manmohan, J.R. (2011). Performance of component crops in tree-crop farming system under arid region. *Indian Journal of Horticulture*, **68(1)**: 06-11.
2. Awasthi, O.P. **and Singh, I.S.** (2010) Effect of ber and pomegranate plantation on soil nutrient status of Typic Torripsamments. *Indian Journal of Horticulture*, **67**: 138-142.
3. Awasthi, O.P., **Singh, I.S.** and Bhargava, R (2005). Allelopathic influence of aonla (*Embllica officinalis*) on ground storey crops. *Range Management and Agroforestry*, **26 (1)**: 120-123.
4. Awasthi, O.P., **Singh, I.S.** and More, T.A. (2009) Performance of intercrops during establishment phase of aonla (*Embllica ofiiicialis*) orchard. *Indian Journal of Agricultural Sciences*, **79 (8)**: 587-591.
5. Awasthi, O.P., **Singh, I.S.** and Sharma, B.D. (2006). Effect of mulch on soil hydrothermal regimes, growth and fruit yield of brinjal under arid conditions. *Indian Journal of Horticulture*, **63 (2)**: 192-194.
6. Awasthi, O.P., **Singh, I.S.**, Meena, S.R. (2008) Allelopathic influence of aqueous leaf extract of drumstick on germination and seedling growth of ground storey crops. *Vegetable Science*, **35 (1)**: 100-102.
7. Krishna, Hare, **Singh, I.S.**, Bhargava, R. and Sharma, S.K. (2013) Fruit-based cropping systems for sustainable production. *ICAR NEWS*, **19 (2)**: 9.
8. Kumar, R. Nagarjuna., Meena, S.R., Awasthi, O.P., Samadia, D.K., **Singh, I.S.**, Jain, M.K. and Khatri, B.R. (2009) Cyber extension to transfer of technology to farmers. *International Journal of Tropical Agriculture*, **27 (1-2)**: 205-210.
9. Kumar, Ramesh, Abdin, M.Z., Jha, Vidyanath, **Singh, I.S.** and Kumar, Amit (2020) Optimization of in vitro conditions for embryo culture of *Euryale ferox* Salisb. (Makhana) using 2,4-D as growth regulator. *Annals of Plant Sciences*, **9 (3)**: 3774-3777.
10. Kumari, Anubha, **Singh, I.S.**, Kumar, L., Kumar, Amit, Kumar, Ramesh and Gupta, V.K. (2014) Morphological Characteristics of Makhana Germplasms of Manipur under Darbhanga Conditions. *Journal of AgriSearch*, **1 (3)**: 157-160.
11. Meena, S.R., More, T.A., Awasthi, O.P., Samadia, D.K. and **Singh, I.S.** (2009) Vegetable based farming system in hot arid eco-system of Western Rajasthan.

Agricultural Situation in India, **65**: 619-622.

12. Meena, S.R., More, T.A., Singh, D. and **Singh, I.S.** (2009) Arid vegetable production potential and income generation. *Society of Extension Education*, **9**: 72-75.
13. Meena, S.R., More, T.A., Singh, D., **Singh, I.S.** and Singh, R.S. (2009) Woes and throes of horticultural crop growers in hot arid regions: A Critical Analysis. *Agricultural Situation in India*, **66**: 359-363.
14. Meena, S.R., Singh, D., Dhandar, D.G. and **Singh, I.S.** (2007) Extent of use of agro-chemicals in ber based cropping systems in hot arid environment of Western Rajasthan. *Agricultural Situation in India*, **64**: 433-437.
15. Meena, S.R., **Singh, I.S.**, Samadia, D.K. and Singh, D. (2007) Use pattern of agro-chemicals in ber-based cropping system: ber grower's perceptions. *Indian Journal of Arid Horticulture*, **2**: 47-51.
16. Meena, S.R., **Singh, I.S.**, Shukla, A.K., Singh, D. and Dhandar, D.G. (2006). An evaluation of ber based farming system in hot arid eco-system of western Rajasthan. *Indian Journal of Arid Horticulture*, **1**: 71-73.
17. More, T.A., Sharma, B.D. and **Singh, I.S.** (2007) Strategies for enhancing water productivity in horticultural crops. *Indian Journal of Arid Horticulture*, **2**: 1-8.
18. Nagaraja, A., Saroj, P.L., **Singh, I.S.** and Awasthi, O.P. (2014) Effect of blanching treatments and dehydration methods on rehydration quality of khejri (*Prosopis cineraria*) pods. *Indian Journal of Agricultural Sciences*, **84**: 1063-1068.
19. Raut SM, Gupta N, Everard M. and **Singh IS.** (2020). Commercially and medicinally significant aquatic macrophytes: potential for improving livelihood security of Indigenous communities in northern Bihar, India. *Journal of threatened taxa*, **12 (13)**: 16819–16830.
20. Raut, S.M., Gupta, N. and **Singh, I.S.** (2020) Ecology of Bronze-winged Jacana and Pheasant-tailed Jacana within Makhana Field Habitat. Bird-o-soar#46, In: *Zoo's Print* **35(4)**: 26-29.
21. Singh, A.K., Bharadwaj, R. and Singh, I.S. (2014) Assessment of Nutritional Quality of Developed Faba Bean (*Vicia faba* L.) Lines. *Journal of AgriSearch*, **1**

(2): 91-101.

22. Singh, D. K, **Singh, I.S.**, Kumar, Ujjwal, Kumar, Abhay and Bhatt, B.P. (2018) Traditional Wisdom of *Mallah* Community regarding Makhana Production and Processing in North Bihar. *Indian Journal of Extension Education*, **54 (2):** 76-82.
23. **Singh, I. S.** and Agrawal, H. P. (2003) Characteristics and classification of some rice growing soils of Chandauli district of Uttar Pradesh. *Agropedology*. **13:** 11-16.
24. **Singh, I.S.** and Agrawal, H.P. (2005) Characterization, Genesis, and Classification of Rice Soils of Eastern Region of Varanasi, Uttar Pradesh. *Agropedology*, 15 (1): 29-38.
25. **Singh, I.S.** and Awasthi, O.P. (2006) Managing scarce water resources in hot arid regions: a review. *Indian Journal of Arid Horticulture*, **1:** 32-40.
26. **Singh, I.S.** Awasthi, O.P., Bhargava, R. and Meena, S.R. (2011). Influence of soil water conservation practices on productivity and quality of brinjal. *Agropedology*, **21(2):** 42-51.
27. **Singh, I.S.** Awasthi, O.P., Sharma, B.D., More, T.A. and Meena, S.R. (2011). Soil properties, root growth, water use efficiency, brinjal (*Solanum melongena* L.) production and economics as affected by soil water conservation practices. *Indian Journal of Agricultural Sciences*, **81(8):** 760-763.
28. **Singh, I.S.** Awasthi, O.P., Singh, R.S., More, T.A. and Meena, S.R. (2012). Changes in soil properties under tree species. *Indian Journal of Agricultural Sciences*, **82(1):** 146-151.
29. **Singh, I.S.**, Awasthi, O.P. and Meena, S.R. (2006). Influence of mulch on soil hydrothermal regimes, leaf and soil nutrient concentrations, growth and fruit yield of brinjal grown under arid ecosystem, *Agropedology* **16 (2):** 112-116.
30. **Singh, I.S.**, Awasthi, O.P. and Meena, S.R. (2010) Influence of tree plantation on soil physico-chemical properties in arid region. *Indian Journal of Agroforestry*, **12 (2):** 42-47.
31. **Singh, I.S.**, Awasthi, O.P. and Nagaraja, A. (2012). Effect of soil water conservation practices on growth, yield and chemical composition of brinjal on loamy sand soils. *Progressive Horticulture*, **44(2):** 331-335.
32. **Singh, I.S.**, Awasthi, O.P. and Nagaraja, A. (2013) Effect of manuring and mulches on irrigated arid brinjal in Western India. *Indian Journal of Horticulture*, 70 (2): 248-254.

33. **Singh, I.S.**, Awasthi, O.P. and Sharma, B.D. (2010) Influence of tree plantation on soil physico-chemical properties in arid region. *Indian Journal of Agroforestry*, **12**: 42-47.
34. **Singh, I.S.**, Awasthi, O.P., Bhargava, R. and Meena, S.R.. (2010) Influence of soil water conservation practices on hydrothermal environment of soil, plant growth, water use efficiency, production, nutrient removal, fruit quality of eggplant and economics. *Agropedology* (**Accepted**) wide letter No. 03/2010, dated: 27th March, 2010.
35. **Singh, I.S.**, Awasthi, O.P., Sharma, B.D., Bhargava, Rakesh and Meena, S.R. (2009) Influence of soil moisture conservation practices on soil properties under arid conditions of Rajasthan. *Indian Journal of Arid Horticulture*, **4**: 37-39.
36. **Singh, I.S.**, Awasthi, O.P., Sharma, B.D., More, T.A. and Meena, S.R. (2010) Soil properties, root growth, water use efficiency in brinjal (*Solanum melongena*) production and economics as affected by soil water conservation practices. *Indian Journal of Agricultural Sciences*, **81**: 760-763.
37. **Singh, I.S.**, Kumar, Manoj, Raut, S.M., Thakur, A.K. and Singh, S.P. (2020) Integrated Nutrient Management Package for Field Cultivation of Makhana in North Bihar. *Journal of AgriSearch*, **7 (3)**: 138-141.
38. **Singh, I.S.**, Kumar, Manoj, Thakur, A.K., Choudhary, A.K., Bhatt, B.P., Singh, S.P. and Prasad, S. S. Prasad (2019) Physico-Chemical Properties of Soil and Mineral Composition of Plants as Affected by Fox Nut-Based Cropping Systems. *Agropedology*, **29 (01)**: 51-60.
39. **Singh, I.S.**, Singh, Dhiraj Kumar, Thakur, A.K., Kumar, Manoj, Jana, B.R., Raut, S.M., Bhatt, B.P., Singh, S.P., Yadav, Pankaj Kumar and Kumar, Anil (2019) Assessment of Macro and Microelement Accumulation Capability of Aquatic Weeds Growing with Gorgon Nut. *Agropedology*, **29 (01)**: 67-71.
40. Thakur, A.K., **Singh, I.S.** and Shambhu, V.B. (2019) Drying Characteristics of Plum Tomato under Different Physical Treatments for Producing Powder. *Journal of Agricultural Engineering*, 56(4): 258-268.

Technical Bulletin

1. Awasthi, O.P., Saroj, P.L., **Singh, I.S.** and More, T.A. (2007) Fruit Based Diversified Cropping System for Arid Regions. *Technical Bulletin* No. 25. Pp. 1-18. Published by Central Institute for Arid Horticulture, Bikaner (ICAR).
2. Kumar, Lokendra, Gupta, V.K., Jha, B.K., Singh, I.S., Bhatt, B.P. and Singh, A.K. (2011) Status of Makhana (*Euryale ferox* Salisb.) Cultivation in India. *Technical Bulletin* No.R-32/PAT-21 Pp. 1-31. Published by ICAR Research Complex for Eastern Region, Patna.
3. Kumar, Lokendra, **Singh, I.S.**, Gupta, V.K., Bhatt, B.P., Jha, B.K. and Sikka, A.K. (2013) Makhana ki Kheti Ki Unnat Takneek *Technical Bulletin* Pp. 1-31. Published by ICAR Research Complex for Eastern Region, Patna.
4. Meena, S.R., **Singh, I.S.**, Singh, R.S and Sharma, S.K. (2011) Adoption of Horticultural Technologies in Hot Arid Regions: Constraints and Considerations. *Technical Bulletin* No. 40. Pp. 1-34. Published by Central Institute for Arid Horticulture, Bikaner (ICAR).
5. Singh, D.K., Kumar Abhay, Singh, I.S., Kumar Ujjwal, Chandra Naresh and Bhatt, B.P. (2020) Value Chain Analysis of Makhana. *Technical Bulletin No. R-67/Patna-38*, ICAR-Research Complex for eastern Region, Patna, India
6. **Singh, I.S.**, Awasthi, O.P., Sharma, B.D., More, T.A. and Meena, S.R. (2011) Soil Fertility Changes under Fruit Trees in Thar Desert Ecosystem. *Technical Bulletin* No. 37. Pp. 1-34. Published by Central Institute for Arid Horticulture, Bikaner (ICAR).

Research papers presented in conferences and symposia

1. Kumar, Amit, Kumar, Ramesh, **Singh, I.S.** and Jha, Vidyanath (2020). Bioaccumulation of Plant Nutrients by *Euryale ferox* Salisb. Oral paper presented in the National Seminar-cum-Training Programme on Propagation, Management and Value Addition of Bamboo Plants for Socio-Economic Development. February 26-27, 2020 at BSS College, Supaul – 852131, Bihar, India and Published in the

Souvenir –cum- Abstract Book of the National Seminar, p. 27.

2. Kumar, Amit, Kumar, Ramesh, *Singh, I.S.* and Jha, Vidyanath (2020). Biochemical Analysis of *Euryale ferox* Seeds. Oral paper presented in the National Seminar-cum-Training Programme on Propagation, Management and Value Addition of Bamboo Plants for Socio-Economic Development. February 26-27, 2020 at BSS College, Supaul – 852131, Bihar, India and Published in the Souvenir –cum- Abstract Book of the National Seminar, p. 28.

3. Kumar, Ramesh, Kumar, Amit, Singh, I.S. and Jha, Vidyanath (2020). Use of Bamboo in Rural-based Small Cottage Industry. Oral paper presented in the National Seminar-cum-Training Programme on Propagation, Management and Value Addition of Bamboo Plants for Socio-Economic Development. February 26-27, 2020 at BSS College, Supaul – 852131, Bihar, India and Published in the Souvenir –cum- Abstract Book of the National Seminar, p. 54.

4. Kumar, Ramesh, Kumar, Amit, **Singh, I.S.** and Jha, Vidyanath (2020). Optimization of Embryo Culture for in vitro Condition of *Euryale ferox* Salisb. (Makhana). Oral paper presented in the National Seminar-cum-Training Programme on Propagation, Management and Value Addition of Bamboo Plants for Socio-Economic Development. February 26-27, 2020 at BSS College, Supaul – 852131, Bihar, India and Published in the Souvenir –cum- Abstract Book of the National Seminar , p. 53.

5. Kumar, Ramesh, Kumar, Amit, **Singh, I.S.** and Jha, Vidyanath (2020). Morphological Studies on *Euryale ferox* Salisb. (Makhana). Oral paper presented in the National Seminar-cum-Training Programme on Propagation, Management and Value Addition of Bamboo Plants for Socio-Economic Development. February 26-27, 2020 at BSS College, Supaul – 852131, Bihar, India and Published in the Souvenir –cum- Abstract Book of the National Seminar, p. 59.

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India and published in the Souvenir & Abstract Book (ISBN 978-93-85516-73-3) of the Conference, pp: 36-43.

7. Choudhary, A. K.; Sultana, Rafat; Timmanna, Ontagodi; **Singh, I. S.** and Bhatt, B. P. (2015). Recent advances in breeding pigeonpea (*Cajanus cajan* L.). Lead paper presented in the National Conference on Global Research Initiatives for Sustainable Agriculture and Allied Sciences (GRISAAS-2015), December 12-13, 2015 at RVSKVV, Gwalior (MP), India and published in the Souvenir & Conference Book (ISBN 819039644-8) of the Conference, pp: 7-10.

8. **Singh, I.S.**, Kumar, Lokendra, Choudhary, A.K., Thakur, A.K. and Sharma, R. (2015) Effect of makhana-based cropping systems on physico-chemical properties of soil. Abstract of the paper published in the Compendium of XII Agricultural Science Congress on "Sustainable Livelihood Security for Smallholder Farmers" held at ICAR- National Dairy Research Institute, Karnal, Haryana, India during February 3-6, 2015, Pp. 101-102.

9. **Singh, I.S.**, Kumar, Lokendra, Choudhary, A.K., Thakur, A.K. and Singh, S.P. and Prasad, S.S. (2016) Comparison of fertility status of soils of makhana growing pond and shallow agricultural fields. Abstract of the paper published in the Book of Abstracts of National Seminar on "Soil Health Management" held at BAU, Sabour, Bhagalpur, Bihar during 28-29th January, 2016, p. 47.

10. Thakur, A.K., **Singh, I.S.** and Sharma, Rajvir (2015) Makhana harvesting and processing-research aspect and prospect. Presented orally in 49th Annual Convention of ISAE and Symposium on Engineering Solutions for Sustainable Agriculture and Food Processing, College of Agricultural Engineering Technology, Punjab Agricultural University, Ludhiana, Punjab during 23-25 February, 2015.

11. Choudhary, A.K and **Singh, I.S.** (2017) Quality Seeds in Market-driven Agriculture. In: Market Led Agricultural Extension-Concept and Practices (Eds. Kumar et. al.) Training Manual, Published by ICAR RCER, Patna-14. Pp. 179-184.

12. **Singh, I.S.**, Kumar, Lokendra, Singh, S.P, Prasad, S.S., Choudhary, A.K., Thakur, A.K. and Bhatt, B.P. (2016) Nutrient contribution to the soil by Makhana

(*Euryale ferox* Salisb.) and water chestnut (*Trapa bispinosa*). Published in Book of Abstract of National Conference on Rural Livelihood Security through Innovative Agri-entrepreneurship, March 12-13, held at ICAR Central Potato Research Station Patna, Bihar, India. pp. 120-121.

Books:

1. More, T.A., Awasthi, O.P., Singh, R.S., Samadia, D.K., R. Nagarjuna Kumar, **Singh, I.S.**, Singh, D., Meena, S.R. and Nallathambi, P. (2008) Book of Abstracts, National Seminar on "Opportunities and Challenges of Arid Horticulture for Nutrition and livelihood" organized by Indian Society for Arid Horticulture during 8-9 March, 2008 at CIAH, Bikaner, 144p.
2. More, T.A., Singh, D., Awasthi, O.P., Samadia, D.K. and **Singh, I.S.** (2008) Hi-Tech Production of Arid Horticulture. *CIAH/RES/PUB/No. 33*.

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3. Soni, M.L., Talwar, H.S., Beniwal, R.K., Rathore, V.S., Singh, J.P., **Singh, I.S.** and Yadav, N.D. (2007). Soil Management: key Issues. *In: Emerging trends in soil management* (Eds. B.B.S. Kapoor, S.K. Mathur and M.L. Soni). Madhu publication. Bikaner, pp. 193-220.
4. Shukla, A.K., Shukla, A.K., Singh, J. and **Singh, I.S.** (2007). Damask Rose. *In: Medicinal and Aromatic crops* (Eds. J. Singh), Aavishkar Publishers,

Distributors, Jaipur, pp. 203-213.

5. Singh, I.S., Awasthi, O.P., Bhargava, R. and Meena, S.R. (2008) Soil-water conservation measures in brinjal (*Solanum melongena* L). In: Natural Resource management for sustainable development in western Rajasthan (Eds. Prasad *et al.*) Allied Publishers Pvt. Ltd. New Delhi, pp. 135-137.

6. Singh, I.S., Awasthi, O.P., Sharma, B.D., Meena, S.R. and Kumar, R.N. (2008) Changes in soil physical and chemical properties under long and short term fruit production in hot arid regions. *In: Hi-Tech Production of Arid Horticulture* (Eds. More *et al.*) Central Institute for Arid Horticulture, Beechwal, Bikaner, pp. 354-360.

7. Sharma, B.D. and **Singh, I.S.** (2008) Fertigation concept and practices for arid zone fruits *In: Hi-Tech Production of Arid Horticulture* (Eds. More *et al.*) Central Institute for Arid Horticulture, Beechwal, Bikaner, pp. 338-345.

8. Sharma, B.D. and **Singh, I.S.** (2008) Integrated nutrient management: An overview of principles, problems and prospects in fruit crops *In: Hi-Tech Production of Arid Horticulture* (Eds. More *et al.*) Central Institute for Arid Horticulture, Beechwal, Bikaner, pp. 338-345.

9. Awasthi, O.P. and **Singh, I.S.** (2008) Fruit-based multi-species cropping system in arid region. *In: Hi-Tech Production of Arid Horticulture* (Eds. More *et al.*) Central Institute for Arid Horticulture, Beechwal, Bikaner, pp. 378-382.

10. Kumar, R.N., Meena, S.R., **Singh, I.S.** and More, T.A. (2008) Information and communication technology initiatives in agricultural research and development- research needs. *In: Hi-Tech Production of Arid Horticulture* (Eds. More *et al.*) Central Institute for Arid Horticulture, Beechwal, Bikaner, pp. 354-360.

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