

Profile of Scientist

1. Name of the Scientist: Dr Sudhir Kumar Shukla

2. Personal Biodata:

a) Position/Designation: Principal Scientist (Agronomy)

b) Contact Details:

i. ICAR Email ID: Sudhir.Shukla@icar.gov.in

ii. Personal Email ID: sudhirshukla151@gmail.com

iii. Mobile No.: 09451188723; 09335303793

c) Joining date in:

i. ICAR: 14.09.1993

ii. IISR: 09.09.1994

d) Discipline and Specialization: Agronomy; Sugarcane agronomy

e) Training/advance exposure in the area of work:



Duration of training	Title of the training and name of the institution	Period	
		From (DD/MM/Y YYY)	To (DD/MM/Y YYY)
10-20 days duration	Short Course on Use of Simulation Models in Climate Change Research with Special Reference to Natural Resource Management at Indian Institute of Soil Science Bhopal	03.10.2012	12.10.2012
	Management Development Programme on Leadership Development (a Pre RMP Programme) at NAARM, Hyderabad	30.11.2015	11.12.2015
21 to 89 days duration	<i>Recent Advances in Agronomy for Efficient Resource Management</i> at G.B. Pant University of Agriculture and Technology, Pantnagar.	03.06.1996	23.06.1996
	Summer School on <i>Efficient Resource Management in Irrigated Agro Ecosystem</i> at PAU, Ludhiana,	18.06.2001	17.07.2001
3 months or more	47 th Foundation Course on Agricultural Research Management (FCARPM) at NAARM, Hyderabad (A.P.).	14.09.1993	09.02.1994
	Subject matter training at IARI, New Delhi.	10.02.1994	31.08.1994

f) Contribution to the scientific advancement:

1. Potassium fertigation for improving stubble bud sprouting in winter initiated sugarcane ratoon:

Application of potassium (80 kg K₂O ha⁻¹) with irrigation water in standing plant cane one month prior to harvest improves bud sprouting by increasing reducing sugars and developing winter hardiness. These in turn increases the number of millable cane and cane yield of winter initiated ratoon.

2. Bio- intensive modulation of sugarcane ratoon rhizosphere vis-à-vis soil health: Application of *Trichoderma viride* and *Gluconacetobacter* amended FYM @15 t ha⁻¹ increases available NPK, organic carbon, SMBC and SMBN in ratoon field. Incorporation of sugarcane trash @ 8 t ha⁻¹ with *Trichoderma viride* culture @ 20 kg ha⁻¹ ensures its faster decomposition and improves soil quality.

3. Crop diversification and nutrient management: Application of 200 kg N to Sugarcane and 75 kg to mustard alongwith 60 kg S/ha in intercropping system increases cane equivalent yield and total economic return over Mustard-Sugarcane sequential system. Application of 40 kg S ha⁻¹ is adequate for sugarcane plant crop. However, its residual effect in ratoon is observed at 80 kg S/ha.

4. Overlapping cropping of wheat and sugarcane under Furrow Irrigated Raised Bed System (FIRBS) for improving input use efficiency and sugarcane productivity: There has been 54% yield advantage in sugarcane by its planting in October and wheat in November under FIRBS over Wheat – Sugarcane sequential system. FIRB system economizes 25% each of irrigation water and fertilizer N as compared to wheat under flat method.

5. Seed cane economy by reducing sett size and optimizing soil moisture regime: One third reduction in seed cane could be possible by adopting two bud setts planting in combination with two irrigations during germination phase. It produced similar yield level (70.48 t/ha) to three bud sett planting and no irrigation just after planting. Thus seed cane multiplication ratio increased by adopting 2 bud setts. Vertical planting. of single bud improved the germination crop growth and yield significantly.

Research projects completed: Pursued 25 institute and externally funded (DST) research projects during the period involving carbon sequestration in sugarcane based system for sustaining soil health and crop productivity, sugarcane based diversification options involving mustard, wheat, sunflower, optimizing N and S nutrition in sugarcane based system to improve system productivity, improving productivity of late planted cane through furrow irrigated raised bed system (FIRBS), deep tillage under different moisture regimes, stubble sprouting of ratoon through K fertilization and on improving ratoon productivity through integration of organic and inorganic fertilizers.

Contributions to Physical and Infrastructural Development : Created Microbial Consortia Production Unit and generated Rs 80 lakhs revenue through sale of >250 tonnes solid based biofertilisers at the Institute, acquired Portable Photosynthesis Measurement System (Rs 16 lakhs), CHNS/O Analyser (Rs 26 lakhs) under DST sponsored project and Kjeltex N Analyser (Rs 13 lakhs) and Double beam spectrophotometer (Rs 6 lakhs) in Soil-Water- Plant Analysis and Microbiology Lab. Acquired Auto Pol (Rs 30 lakhs) in Central Juice Analysis Lab. Incharge Business Planning and Development Cell (BPD) and assisted in preparation of MoUs with 9 universities for post graduate training and research and 6 sugar mills for consultancy to be provided (4 DSCL group and 2 Shamli group) and one firm M/S Fine Trap India, Pune for licensing of Combo Trap (total revenue Rs 16.5 lakhs). Assisted in execution of fifteen contract research projects (Rs 110 lakhs) and guided 14 postgraduate and 2 Ph.D candidates (fee

received Rs 3.40 lakhs). Created advanced facility for soil samples analysis at the Institute and generated Rs 2 lakhs revenue during 2012-15.

Interdisciplinary programme formulation: Formulated and executed 18 multidisciplinary programmes involving disciplines of agronomy, soil and water conservation engineering, agril engineering, plant physiology, entomology, soil science, plant pathology, agril microbiology for sustaining soil health and improving sugarcane productivity.

Participation in research activities: Carbon sequestration for sustaining soil health and improving crop productivity, seed cane economy, optimizing N and S nutrition in sugarcane, alternative options for late planting sugarcane in subtropical India, deep tillage under different moisture regimes, potassium application for stubble sprouting in winter season and on improving ratoon productivity through integration of organic and inorganic fertilizers.

Mobilisation of External fundings for projects: DST project on Carbon sequestration (Rs 74 lakhs- PI), Microbial Consortia sold (Rs 80 lakhs), MoU with mills for consultancy and license fee received (Rs 14.5 lakhs), Contract projects (Rs 110 lakhs), training fee in SWPAM lab (Rs 3.40 lakhs) and soil samples analysis fee received (Rs 2 lakhs).

3. Future Planning of research (in bullets):

- Improving ratoon cane productivity in subtropical India
- Reducing the cost of production of sugarcane and increase the net profit to growers

4. Publications (best five):

1. Shukla, S. K', , R. L. Yadav, P.N. Singh and Ishwar Singh	2009	Potassium nutrition for improving stubble bud sprouting, dry matter partitioning, nutrient uptake and winter initiated sugarcane (<i>Saccharum</i> spp. hybrid complex) ratoon yield	European Journal of Agronomy, 30: 27-33	E097/8.70
2. Shukla, S K., Menhi Lal and Singh, S K	2013	Improving bud sprouting, growth and yield of winter initiated sugarcane ratoon	Soil and Tillage Research, Elsevier Publication 126, 50-59	S047/8.62
3. Shukla, S.K. Yadav, R.L. Archna Suman, Singh, P.N.	2008	Improving rhizospheric environment and sugarcane ratoon yield through bio-agents amended farm yard manure in <i>udic ustochrept</i> soil	Soil and Tillage Research, 99(2):158-168, Elsevier publication	S047/8.62
4. Yadav, R.L., Shukla, S.K. A. Suman, Singh, P.N	2009	<i>Trichoderma</i> inoculation and trash management effects on soil microbial biomass, soil respiration, nutrient uptake and yield of ratoon sugarcane under subtropical conditions	Biology and fertility of Soils (2009) 45:461-468	B081/9.40
5. Singh, P.N., Shukla, S.K. and Bhatnagar, V.K	2007	Optimizing soil moisture regime to increase water use efficiency of sugarcane (<i>Saccharum spp</i> hybrid complex) in subtropical India.	Agricultural Water Management 90 (1-2): 95-100	A076/8.29

5. Other relevant activities of Scientist:

- **Received SAP Gold Medal-2015** for outstanding work in Natural Resource Management by the Society of Scientific Professionals, CSUAT, Kanpur.
- **Received Fertiliser Association of India (FAI) Gold medal**, citation and Rs 50,000 cash award for outstanding work on integrated nutrient management in sugarcane during 2014.
- **Received Noel Deerr Gold Medal** from Sugar Technologists Association of India (STAI) for outstanding contributions in Carbon Sequestration in Sugarcane Based System
- **Received Indian Society of Agronomy (ISA) Fellow-2014**
- Received Uttar Pradesh Academy of Agricultural Sciences (**UPAAS Fellow-2014**) in the field of Natural Resource Management
- Pt Ram Ratan Smrati Samman for outstanding work in field of Agriculture from **Vivekanand Grameen Vikas Sansthan**, Lucknow Uttar Pradesh
- M. S. Swaminathan Award for outstanding work in Sugarcane Agriculture
- Made outstanding contributions in the field of Sugarcane Based Cropping System Research. Major research work is focused on improving carbon sequestration in sugarcane based system, role of bio agents viz., *Trichoderma* and *Gluconacetobacter* in modulating rhizospheric environment and improving crop productivity, optimizing soil moisture regime, deep tillage in plant-ratoon system and its effect on soil carbon, water, nutrient use efficiencies and crop yield.
- Contribution made in sugarcane trash management and improving sprouting of winter initiated ratoon through K fertilization which has ample scope for improving crop productivity *vis-à-vis* reducing cost of production and sustaining soil health.
- Published more than 60 research papers, 2 books, 10 book chapters, 6 technical bulletins and 16 reports.
- Publication '**RASDHARA**' elaborating agro-techniques of sugarcane in poetry popularized.
- Guided/ trained 15 students of B Tech., M.Sc., M. Phil and Ph. D.

(S K Shukla)