

Contributions of Dr. S. Pradhan to the field of Entomology

*Sangeeta B. Kattimani, Sachin S. Suroshe, Suresh, M. Nebapure
and Rajna S*

Dr. Shyam Sunder Lal Pradhan, was one of the eminent entomologists in India and was the master of all entomological research areas. He played a remarkable role in bringing the crop protection science in forefront in agriculture science in India. His profound experience in research and teaching in the field of entomology for 33 years, contributed tremendously in fundamental and applied aspects. No surprise he is being known as the 'Father of Modern Applied Entomology' in India.

Early life

Dr. Shyam Sunder Lal Pradhan was born on 13th May, 1913 at Dihwa village, Uttar Pradesh. He completed his schooling from Lucknow with distinction in mathematics in UP board examination. He passed Intermediate examination with a gold medal from Radhaswamy Educational Institute at Agra. He topped Lucknow University in B.Sc. degree in 1932 and completed M.Sc. degree in 1934. The very first support for his entomology research came from Prof. K.N. Bahl under whom he worked in the field of functional morphology and thus awarded D.Sc. degree with best adjudged thesis. His popularity has reached beyond India when he went to Rothamsted Experimental Station, United Kingdom to do a part of PhD research work in Insect toxicology and endowed with Ph.D. degree from the Lucknow University in 1948.



Dr. S. Pradhan

Professional Career

He started his career in 1940 at Indian (Imperial) Council of Agricultural Research, Gorakhpur, UP where he worked on sugarcane pests for a very short period. In the same year, he had joined as an assistant Entomologist at Indian (Imperial) Agricultural Research Institute, Karnal Sub-station, where he worked on Insect Ecology. His experience in insect toxicology from Rothamstead Experimental Station motivated him to establish country's first school of Insect toxicology in 1948 at Division of Entomology, IARI, Pusa, New Delhi. Being a potent academician, Dr. S Pradhan was appointed as the first professor, Division of Entomology in 1958. He became the Head of the Division in 1962 and served for more than 11 years in the position. On 5th February, 1973 he took his heavenly

abode before his scheduled retirement from service.

Contributions in research

Dr. Pradhan was dynamic Entomologist and had contributed in different fields of insect science like insect morphology, insect physiology, insect ecology, insect toxicology and storage entomology. He was instrumental in filling research gaps on homology of male genitalia, “Gnathal Glands” in coleopterans, coiling and uncoiling mechanism of proboscis in Lepidoptera. Studies on regeneration of mid-gut epithelium, function of Malpighian tubules in coccinellid beetle and morphology of alimentary canal contributed to the developing areas of insect physiology. His proficiency in mathematics helped to be an accomplished insect ecologist. His contributions on the effect of abiotic and biotic factors on insect life, population dynamics of the pest, assessment and sampling of pest damage and crop losses are highly significant in insect ecology. The classical works like ‘Pradhan’s equation’ and development of ‘biometer’ are feathers on his cap. With Biometer, he could explain to calculate the date of emergence of insect from one stage to another based on daily bio-thermic value using thermal constant. His well-known ‘Biotic theory of periodicity of locust cycles’ (1965) describes the temporal and spatial distribution and abundance of locusts. The invention of ‘Pusa bin’ by Dr. S Pradhan and coworkers in 1969 revolutionized the storage entomology research in India.

In the later part of his research, he worked intensively on insect toxicology. Dr. Pradhan evolved effective chemical control measures against many crop pests through bioassay and field trials. Moreover, his

contributions in toxicology included relationship between temperature and insecticide toxicity, relationship between particle size of suspensions and insect mortality, insecticide penetration through insect cuticle *etc.* In one of the most significant contribution, he demonstrated the strong antifeedant activity of neem. The deterrent activity of neem against locust was observed by him and coworkers during locust invasion in 1962 at IARI, Pusa Farms, New Delhi. He was the first to report development of resistance in Singhara beetle against DDT and BHC from Tihari and Dabri villages of New Delhi in 1963. His concept of ‘pesticide umbrella’, also gained importance in terms of attaining more yield. His leadership made to commence research on insecticide residues at the Division of Entomology, IARI, New Delhi. Dr. S. Pradhan was one of the earliest proponents of the concept of ‘integrated pest management’. Studies on host plant resistance were intensified during his tenure as a head of the division. He always emphasized that crop protection research should possess a right place among the agricultural research efforts of the country.

Writer and Mentor

Dr. Pradhan has written about 200 research papers in various Indian and foreign journals and several popular articles in Hindi and English. He wrote two famous books, “Insect Pests of Crops” (1969) and “Agricultural Entomology and Pest Control” (1983). He has guided nearly 65 students including one M. Sc. and 19 Ph. D students. Being the first professor of Entomology, he was instrumental in setting the curricula for M.Sc. and Ph.D. courses of the Division. His chapter on ‘Ecology of arid zone insects excluding locusts and grasshoppers in

Human and animal ecology was published by UNESCO.

Awards and honors

Dr. S. Pradhan was the first professor (1958) and was also Head of the Division of Entomology (1962-1973) at IARI, New Delhi. He got Dr. P.B. Sarkar Endowment prize for triennium (1971-1974) from Division of Agricultural Chemicals, IARI, Pusa, New Delhi. He was also awarded with Hari Om Ashram award for his outstanding contribution to science that led to increased production in 1973. He was president of ESI (Entomological Society of India) and also Fellow of Indian National Science Academy. The Silver Jubilee of the society was celebrated in 1964 and a National Seminar was also organized under his able leadership and guidance. In 1969, he organized the International Seminar on Integrated Pest Control as President of the Society. Dr. Pradhan was also Chairman of Entomology Committee of ICAR, New Delhi for many years.

Recognition from abroad

He was one among the six reputed persons invited by UNESCO in 1954 to write a chapter on “Ecology of arid zone insects excluding locusts and grasshoppers” in Human and Animal Ecology published by UNESCO. His theory of “periodicity of locust cycle” was presented at Porton, U.K. in 1970. He was a co-member of FAO panel experts on integrated pest management (IPM). Dr. Pradhan chaired three important sessions in the 14th International Congress of Entomology, held at Canberra, Australia, in August 1972.

Tribute to the legendary scientist

The research of Dr. S. Pradhan is remembered through series of lectures (Dr. S. Pradhan memorial lecture) organized by Division of Entomology every year. Till now, a series of 12 lectures were organized by Division of Entomology, ICAR-IARI. Dr. S. Pradhan would serve as role model to many young entomologists across the world.

References

Pradhan, S., Jotwani, M.G. and Rai, B.K. 1962. The neem deterrent to locust. *Indian Farming*, **12**(8):7-11.

Pradhan, S., Jotwani, M.G. and Sarup, P. 1963. Failure of DDT and BHC to control Singhara beetle *Galerucella birmanica* (Chrysomelidae: Coleoptera). *Indian Journal of Entomology*, **25**(2):176-179.

Pradhan, S. 1965. A New biotic theory of the periodicity of locust cycles. *Indian journal of Entomology*, **27**: 95-101.

Pradhan, S. 1969. Insect Pest of Crops, pp. 195-200. National Book Trust pub., New Delhi, India.

Pradhan, S. 1971. In tropics protection research more needed than production research. *Indian Journal of Entomology*, **33**(3): 233-259.

AUTHORS

Sangeeta B. Kattimani, Sachin S. Suroshe Suresh M. Nebapure (corresponding author) and Rajna S, Division of Entomology, ICAR-Indian Agricultural Research Institute, New Delhi- 110 012, India. Email: smnebapure@gmail.com
