



## Insights

### Black face of green revolution in Malwa region of Punjab

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Among the various states of India, Punjab was the hub of the green revolution, which made the Punjab's farmers self-sufficient (Sidhu & Byerlee 1992). As per the statistical abstract of Punjab report (2005), the grain production in Punjab increased from 3.16 million tons in 1960–1961 to 25.66 million tons in 2004–2005. Similarly, the production of cotton increased from 0.12 million tons in 1960–1961 to 0.37 million tons in 2007–08 (increase more than 3 times) with a mere 1.35-fold increase in the area under cotton cultivation (Barik 2010). This increased production had some major drawbacks, one of which was a high use of pesticides (Shiva 1991). Unfortunately, over the past five decades health of the people of Punjab has deteriorated as green revolution brought changes in their agricultural practices and lifestyle. About 54% of the total pesticide consumption of India is on cotton alone, though it is grown in only 5% of the total cultivable area in India (Mittal et al. 2013). The pests have developed resistance to almost every pesticide due to their continuous excessive usage. There are serious environmental problems and health concerns resulting from the excess use of pesticides. Studies in Punjab have shown that there are pesticide residues in milk from cattle, in fruits, vegetables and even in breast milk. The pesticides like t- HCH, heptachlor, aldrin, chlordane, t-DDT, t-endosulfan, chlorpyrifos, malathion, monocrotophos, and phosphamidon have been detected in the blood samples of Malwa region of Punjab. The farmers, primarily agricultural workers, and local communities are inadvertently exposed directly or indirectly to the harmful pesticides by oral ingestion, dermal absorption, and inhalation. The WHO has estimated that every year 3 million cases of acute pesticide poisonings occur globally and out of this 10% die (Gunnell & Eddleston 2003). On average 25-30% peoples are being admitted in hospitals due to pesticide poisoning annually in this region (Garg & Verma 2010). Most of the pesticides have been reported to cause brain cancer, leukemia, and lung cancer, colon cancer, pancreatic cancer, prostate cancer and breast cancer (Weichenthal et al. 2010; Andreotti & Silverman 2011; Landau-Ossondo et al. 2009; Mittal et al. 2013). The state government had conducted a comprehensive door-to-door survey and showed that Punjab has a higher incidence of cancer than the rest of the country. There are at least 108 cancer patients for every 100,000 population in Punjab in comparison with national average of 80 per 100,000 populations. Cancer is so prevalent in the Malwa region that the region has been called India's cancer capital. The data show a continuous increase in the number of cancer cases in the last 12 years. The highest number of cancer cases are recorded in these four districts of Muktsar, Mansa, Faridkot, and Bathinda. Villages Giana and Jajjal in the Bathinda district have been declared as "cancer stricken villages." The studies by Thakur and his co-workers revealed that 125 cancer cases and 52 deaths per year per 100,000 population occurred in the Talwandi Sabo block of the Bathinda district (Thakur et al. 2008). A survey by DHFW (2013) reported 34,430 cancer deaths in the Punjab and of this, the Malwa region alone comprised 46% of the cases. The unusually high cancer incidences, especially in the cotton growing districts of south-western Punjab, has been linked to the use of pesticides by cotton farmers.

In a survey of total population of 183243 consisting of 39732 families in 129 villages- a population of 85315 in 36 villages of Talwandi Sabo block conducted by PGIMER on behalf of the Punjab Government revealed that cancer of female reproductive system, i.e. breast, uterus/cervix and ovary were more common in Talwandi sabo than any other area (Kumar 2005). The number of childless couples and young males with infertility was terrifyingly high in more than 100 villages of the Malwa region (Dutt 2007). The miscarriage rate varies with the pesticide used (Garry 2004). Pathak et al. 2010 revealed the possible association of organochlorine pesticides in

the pathogenesis of recurrent miscarriages. Pesticides have been reported to have adverse effects on mental and psychomotor development by acting as potent neurotoxins (Abou-Donia 2003; Bouchard et al. 2011). Persons exposed to pesticides may feel intelligence quotient (IQ) and learning disability, permanent brain damage, the risk of Parkinson's disease as well as dementia (Rugbjerg et al. 2011). The soils of Punjab have become deficient in micronutrients in a space of 45 years. Intensive agriculture practices have deteriorated the pedosphere, lithosphere, atmosphere, hydrosphere and biosphere of Punjab. The rice fields in Punjab state are consuming 85% of all freshwater supplies. In fact, India is using 'virtual water' by getting wheat and rice from Punjab state. According to International Rice Research Institute (IRRI), the situation has reached such alarming proportions that questions are now being asked as to what extent rice cultivation should be permitted in the irrigated Indo-Gangetic Plains. The quality of groundwater is deteriorating due to industrial and agricultural activities resulting in a high concentration of heavy metals such as arsenic, cadmium, chromium, nickel and lead in groundwater. Within the past decade, pesticide residues have more frequently been detected in the groundwater, and in many cases at levels exceeding the 0.1 µg/l safe limit set by the European standards. The Punjab Agricultural University at Ludhiana has recommended only seven sprays of pesticides on cotton in six months, but farmers in Bhatinda spray as many as 32 times in six months. The lack of awareness about the ill effects of pesticides in farmers and the widespread misconceptions in mind of farmers that more use of pesticides will yield better crops is posing a serious health risk to the population of the region. It's high time now we should shift our focus to organic farming practices if we want to save our next generation from serious health disorders.

## References

1. Abou-Donia M. 2003. Organophosphorus ester-induced chronic neurotoxicity. *Archives of Environmental Health: An International Journal*. 58:484-497.
2. Andreotti G, Silverman D. 2011. Occupational risk factors and pancreatic cancer: A review of recent findings. *Molecular Carcinogenesis*. 51:98-108.
3. Barik A. 2010. Cotton statistics at a glance. Directorate of Cotton Development, Ministry of Agriculture, Government of India, Mumbai, Maharashtra, India.
4. Bouchard M, Chevrier J, Harley K, Kogut K, Vedar M, Calderon N, Trujillo C, Johnson C, Bradman A, Barr D, Eskenazi B. 2011. Prenatal exposure to organophosphate pesticides and IQ in 7-Year-old children. *Environmental Health Perspectives*. 119:1189-1195.
5. DHFW. 2013. State wide door to door campaign, cancer awareness and symptom based early detection. Government of Punjab, Chandigarh, India.
6. Dutt U. 2007. Punjab in ecological and health devastation. *Countercurrents.org*.
7. Garg V & Verma S. 2010. Trends of poisoning in rural area of South-west Punjab. *J Indian Acad Forensic Med*. 32:189-93.
8. Garry V. 2004. Pesticides and children. *Toxicology and Applied Pharmacology*. 198:152-163.
9. Gunnell D, Eddleston M. 2003. Suicide by intentional ingestion of pesticides: a continuing tragedy in developing countries. *International Journal of Epidemiology*. 32:902-909.
10. Kumar R. 2005. An epidemiological study of cancer cases reported from villages of Talwandi Sabo block, district Bhatinda, Punjab. Department of Community Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh, India.
11. Landau-Ossondo M, Rabia N, Jos-Pelage J, Marquet L, Isidore Y, Saint-Aimé C, Martin M, Irigaray P, Belpomme D. 2009. Why pesticides could be a common cause of prostate and breast cancers in the French Caribbean Island, Martinique. An overview on key mechanisms of pesticide-induced cancer. *Biomedicine & Pharmacotherapy*. 63:383-395.
12. Mittal S, Kaur G, Vishwakarma G. 2013. Effects of environmental pesticides on the health of rural communities in the Malwa region of Punjab, India: A Review. *Human and Ecological Risk Assessment: An International Journal*. 20:366-387.
13. Pathak R, Mustafa M, Ahmed R, Tripathi A, Guleria K, Banerjee B. 2010. Association between recurrent miscarriages and organochlorine pesticide levels. *Clinical Biochemistry*. 43:131-135.
14. Rugbjerg K, Harris M, Shen H, Marion S, Tsui J, Teschke K. 2011. Pesticide exposure and risk of Parkinson's disease – a population-based case-control study evaluating the potential for recall bias. *Scandinavian Journal of Work, Environment & Health*. 37:427-436.
15. Shiva V. 1991. The green revolution in the Punjab. *The Ecologist* 21(2): 57–60.
16. Sidhu DS, Byerlee D. 1992. Technical change and wheat productivity in the Indian Punjab in the post-green revolution period. *CIMMYT Economics Working Paper* 92-02.
17. Statistical abstracts of Punjab. 2005. Department of Planning, Government of Punjab, Chandigarh, India.
18. Thakur J, Rao B, Rajwanshi A, Parwana H, Kumar R. 2008. Epidemiological study of high cancer among rural agricultural community of Punjab in northern India. *International Journal of Environmental Research and Public Health*. 5:399-407.
19. Weichenthal S, Moase C, Chan P. 2010. A review of pesticide exposure and cancer incidence in the agricultural health study cohort. *Environmental Health Perspectives*. 118:1117-1125.