"CROP RESIDUES BURNING IS DETRIMENTAL TO ENVIRONMENT"

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INTRODUCTION

Environmental Law is a law for the real world, where political, social, scientific and economic factors influence the way that law works in practice. It is an inescapable fact that environmental law and environmental lawyers do not operate within a value-free vacuum. Thus, when environmental rules are placed into the practical context there is a need to be aware that law is not some stand-alone monolith which can be interpreted in isolation from external issues, in particular values.[1] In broad perspective 'environmental values' defined as 'what people believe to be important about the environment and thus what should be the priorities for environmental policy and ultimately environmental law'.[2]

This research paper in hand relates to the burning of crop residues. What to do with crop residues left in fields at the end of a growing season is, literally, a burning issue. Some farmers prefer the inexpensive approach of setting the stubble ablaze, but repeated burning is not good for the soil, and the resulting smoke is a health hazard.

CROP RESIDUES

Agricultural[3] burning is the practice of using fire to reduce or dispose of vegetative debris from an agricultural activity. Some common practices include field burning, large areas of crop residues after harvest to reduce excess plant material, to control crop diseases, weeds or pests, or to maintain crop yields; disposing of piles of agricultural debris, such as orchard trees, limbs, or haystacks; and clearing vegetation out of irrigation ditches and canals.

REASON FOR INCREAING CROP RESIDUES

The rice and wheat system (RWS) is one of the widely practiced cropping systems in northern India. About 90-95 percent of the rice area is used under intensive rice wheat system

[1] Stuart Bell and Donald McGillivray, '*Environmental law*', (5th Edn. 2000, Ist Indian Reprint 2001), Universal Law Publishing, Delhi p.28.
[2] *Ibid.*
[3] Agricultural burning available at http://yosemite.epa.gov/R10/AIRPAGE.NSF/webpage/Agricultural_Burning.mht lasted visited on 26-01-2012.

(RWS) in Punjab (Gadde et al. 2009). Widespread adoption of green revolution technologies and high yielding variety of seeds increased both, crop as well as crop residues. In the last few decades intensive mechanization of agriculture has been occurring and combine harvesting is one of such input, particularly in the RWS. We must make note that in the RWS a short period of time is available between rice harvesting and wheat plantation and any delay in planting adversely affects the wheat crop. This coupled with combine harvesting compels the farmers to burn the residues to get rid of stubble left out after the harvest. The two states namely Punjab and Haryana alone contribute 48 percent of the total production and are subject to open field burning (Gadde et al. 2009). Burning of straw emits emission of trace gases like CO2, CH4, CO, N2O, NOX, SO2 and large amount of particulates which cause adverse.[4]

IMPACT ON ENVIRONMENT

Epidemiological studies show that the contamination of air quality increases adverse health impacts (Ostro et al. 1995). Air pollution contributes to the respiratory diseases like eye irritation, bronchitis, emphysema, asthma etc., which not only increases individuals' diseases mitigation expense but also affect their productivity at work. Though health consequences from burning of agricultural residues are not fully understood, relative short exposure may be more of a nuisance rather than a real health hazard. Many of the components of agricultural smoke cause health problem because of crop residues burning.[5]

The crop residues also contain some percentage of organic pesticides and which adversely affect the environment. The[6] environmental impact of pesticides is often greater than what is intended by those who use them. Over 98% of sprayed insecticides and 95% of herbicides reach a destination other than their target species, including non target species, air, water, bottom sediments, and food.[7] Though there can be benefits using pesticides, inappropriate use can counterproductively increase pest resistance and kill the natural enemies of pests. Many

[4] The combine harvester, also called combine, is a machine that harvests grain crops. It combines into a single operation processes that previously required three separate operations, that is, reaping, binding and threshing.

[5] Alberini A, Krupnick A (2000) 'Cost of illness and willingness to pay estimates of the benefits of improved air quality: evidence from Taiwan', *Land Economics* 76:37–53; http://cerdi.org/uploads/sfCmsContent/html/323/kumar.pdf

[6] Environmental Impact of Pesticide available at http://en.wikipedia.org/wiki/Environmental_impact_of_pesticides last visited 26-01-2012.

[7] Miller GT (2004), *Sustaining the Earth*, 6th edition. Thompson Learning, Inc. Pacific Grove, California. Chap. 9, pp. 211-216.

users are inadequately informed about potential short and long-term risks, and the necessary precautions in the correct application of such toxic chemicals are not always made.[8]

Pesticides can contaminate unintended land and water when they are sprayed aerially or allowed to run off fields, or when they escape from production sites and storage tanks or are inappropriately discarded.[9] Pesticides[10] can contribute to air pollution. Pesticide drift occurs when pesticides suspended in the air as particles are carried by wind to other areas, potentially contaminating them.[11]

EFFECT ON ANIMALS

Pesticides inflict extremely widespread damage to biota, and many countries have acted to discourage pesticide usage through their Biodiversity Action Plans. Animals may be poisoned by pesticide residues that remain on food after spraying, for example when wild animals enter sprayed fields or nearby areas shortly after spraying.[12] Widespread application of pesticides can eliminate food sources that certain types of animals need, causing the animals to relocate, change their diet, or starve.[13] Poisoning from pesticides can travel up the food chain; for example, birds can be harmed when they eat insects and worms that have consumed pesticides. [14] Earthworms digest organic matter and increase nutrient content in the top layer of soil. They aid in protecting human health by ingesting decomposing litter and serving as bio-indicators in soil activity while creating a richer environment. A number of studies have shown that pesticides have had harmful effects on growth and reproduction on earthworms, which are in turn consumed by terrestrial vertebrates such as birds and small mammals.[15] Some pesticides can bio-accumulate, or build up

[8] Damalas, Christos A. and Ilias G. Eleftherohorinos." Pesticide Exposure, Safety Issues, and Risk Assessment Indicators." International Journal of Environmental Research and Public Health. 6 May 2011. Web of Science.

[9] Tashkent (1998), Part 1. Conditions and provisions for developing a national strategy for biodiversity conservation. Biodiversity Conservation National Strategy and Action Plan of Republic of Uzbekistan. Prepared by the National Biodiversity Strategy Project Steering Committee with the Financial Assistance of The Global Environmental Facility (GEF) and Technical Assistance of United Nations Development Programme (UNDP). Retrieved on September 17, 2007.

[10] Environmental Impact of Pesticides available at http://en.wikipedia.org/wiki/Environmental_impact_of_pesticides lasted visited on 26-01-2012.

[11] Cornell University. Pesticides in the environment. Pesticide fact sheets and tutorial, module 6. Pesticide Safety Education Program. Retrieved on 2007-10-11.

[12] Palmer, WE, Bromley, PT, and Brandenburg, RL. Wildlife & pesticides - Peanuts. North Carolina Cooperative Extension Service. Retrieved on 2007-10-11.

[13] Cornell University. Pesticides in the environment. Pesticide fact sheets and tutorial, module 6. Pesticide Safety Education Program. Retrieved on 2007-10-11.

[14] *Ibid.*

[15] Yasmin, Shahla and Doris D'Souza. "Effects of Pesticides on the Growth and Reproduction of Earthworm: A Review." Hindawi Publishing Corporation: Applied and Environmental Soil Science Volume 2010. 27 January 2010: Pages 1-9.

to toxic levels in the bodies of organisms that consume them over time, a phenomenon that impacts species high on the food chain especially hard. [16]

EFFECT ON BIRDS

In England, the use of pesticides in gardens and farmland has seen a reduction in the number of chaffinches. The Fish and Wildlife Service estimates that 72 million birds are killed by pesticides in the United States each year.[17] Bald eagles are common examples of non target organisms that are impacted by pesticide use. Rachel Carson's landmark book *Silent Spring* dealt with the loss of bird species due to bio-accumulation of pesticides in their tissues. There is evidence that birds are continuing to be harmed by pesticide use. In the farmland of Britain, populations of ten different bird species declined by 10 million breeding individuals between 1979 and 1999, a phenomenon thought to have resulted from loss of plant and invertebrate species on which the birds feed.[18] Throughout Europe, 116 species of birds are now threatened. Reductions in bird populations have been found to be associated with times and areas in which pesticides are used.[19] DDE-induced egg shell thinning has especially affected European and North American bird populations.[20] In another example, some types of fungicides used in peanut farming are only slightly toxic to birds and mammals, but may kill off earthworms, which can in turn reduce populations of the birds and mammals that feed on them.[21]

Some pesticides come in granular form, and birds and other wildlife may eat the granules, mistaking them for grains of food. A few granules of a pesticide are enough to kill a small bird. The herbicide parquet, when sprayed onto bird eggs, causes growth abnormalities in embryos and reduces the number of chicks that hatch successfully, but most herbicides do not directly cause much harm to birds. Herbicides may endanger bird populations by reducing their habitat. [22]

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[16] Cornell University. Pesticides in the environment. Pesticide fact sheets and tutorial, module 6. Pesticide Safety Education Program. Retrieved on 2007-10-11.

[17] Fimrite, Peter (June 27, 2011). "Suit says EPA fails to shield species from poisons". *The San Francisco Chronicle*. http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2011/01/21/BAQ21HC5CB.DTL.

[18] Kerbs JR, Wilson JD, Bradbury RB, and Siriwardena GM (August 12, 1999), The second silent spring. Commentary in *Nature*, Volume 400, Pages 611-612.

[19] *Ibid.*

[20] Vos, Joseph G, Erik Dybing, Helmut A. Greim, Ole Ladefoged, Claude Lambré, Jose V. Tarazona, Ingvar Brandt, and A. Dick Vethaak. "Health Effects of Endocrine-Disrupting Chemicals on Wildlife, with Special Reference to the European Situation." National Institute of Public Health and the Environment, Bilthoven, The Netherlands. 2000, Vol. 30, No. 1, Pages 71-133.Web of Science.

[21] Palmer, WE, Bromley, PT, and Brandenburg, RL. Wildlife & pesticides - Peanuts. North Carolina Cooperative Extension Service. Retrieved on 2007-10-11.

[22] *Ibid.*

NEGATIVES OF RESIDUES BURNING[23]

It is revealed from the study that the negative results are likely for land degradation, water infiltration and Immobilization of pesticides by ash of residues burning. It can lead to the major destruction for standing crop by spreading if out of control. It will cause loss of carbon, increase the soil erosion and smoke pollute the air which cause the respiratory diseases like eye irritation, bronchitis, emphysema, asthma etc.

Stubble burning is not only injurious to human health due to environmental hazards involved with it, the process is also harmful for farmers as several friendly pests that save crops from harmful pests, are burnt in the fire. The heat generated by the fire also diminishes the fertility of the soil by burning environments. [24]

BENEFITS OF RESIDUES BURNING[25]

On the other hand the study it is found that by burning the residues it help in faster soil warming and faster soil drying which is more helpful the farmer for cropping next season. Burning crop residues may increase the availability of potash and phosphate which is also leading elimination of pathogen host for diseases and insects. Burning increases grass seed yields significantly.

RESIDUES MANAGEMENT

As raw materials, biomass wastes have attractive potentials for large-scale industries and community-level enterprises. Biomass takes the form of residual stalks, straw, leaves, roots, husk, nut or seed shells, waste wood and animal husbandry waste. Widely available, renewable, and virtually free, waste biomass is an important resource.

With the global campaign to combat climate change, countries are now looking for alternative sources of energy to minimize green house gas (GHG) emissions. Aside from being carbon neutral, the use of biomass for energy reduces dependency on the consumption of fossil fuel; hence, contributing to energy security and climate change mitigation.

There are advantages in the use of biomass. Biomass is a renewable resource that has a steady and abundant supply, especially those biomass resources that are by-products of

[23] Ecological Effects of Residues Burning on Soil Fertility Bobby R.Golden LSU AgCentre Research & Extension; http://www.laagcon.org/Presentations/2011/Multi%20Crop%20Management%20-%20Bobby%20Golden.pdf
[24] *The Tribune (Haryana Plus),* Chandigarh Edition, April 13, 2012 p.4
[25] Ecological Effects of Residues Burning on Soil Fertility Bobby R.Golden LSU AgCentre Research & Extension; http://www.laagcon.org/Presentations/2011/Multi%20Crop%20Management%20-%20Bobby%20Golden.pdf last visited 06-01-2012.

agricultural activity. Its use is carbon neutral, can displace fossil fuels, and helps reduce GHG emissions while closing the carbon cycle loop. As the debate on food versus fuel intensifies, biomass can provide added income to farmers without compromising the production of main food and even non-food crops.[26]

DAY *VERSUS* NIGHT ATMOSPHERIC CONDITIONS

The concept of convective mixing should give you some indication of why burning is not permitted at night. Remember, convective mixing is the dominant force in the atmosphere mixing or diluting smoke with clean air. On any given day we want as much convective mixing as possible. Convective mixing is dependent on the sun heating the ground which in turn heats the air directly above it.

At night little to no convective mixing can occur because there is no heat source. Furthermore, the earth tends to cool more quickly than the atmosphere. Just as during the day the ground heats the air directly above it, at night the ground will cool the air directly above it. As a result, the temperature of the atmosphere tends to **increase** with height.[27]

ROLE OF STATE FOR BAN ON BURNING

The state machinery is taking stringent action imposing complete ban on the burning of wheat stubble and other residuals that remain after the harvesting of crop. The District Magistrate of Fatehabad in Haryana exercising the power vested in him took action u/s 144 of Cr. PC stated that violators would be punishable under section 188 of the IPC. Action would be taken under the Air (Prevention and Control of Pollution) Act, 1981, against those burning stubbles on the fields.[28]

The High Court of Punjab and Haryana in a civil writ petition *Captain Sarbjeet Singh* v. *State of Punjab and others*, directed the State Government to take immediate remedial measures to stop burning of wheat/paddy stubble in the field.[29]

CONCLUSION AND SUGGESTION

As studied from the case to case the agricultural field burning, in particular, has a long and controversial history. Concerns over impacts to public health, safety, and the environment

[26] United Nations Environmental Programme Division of Technology, Industry and Economics International Environmental Technology Centre Osaka/Shiga, Japan 'Converting Waste Agricultural Biomass into a Resource;http://www.unep.or.jp/Ietc/Publications/spc/WasteAgriculturalBiomassEST_Compendium.pdf last visited on 06-01-2012.

[27] http://www.gov.mb.ca/agriculture/soilwater/soil/fbd09s03.html

[28] *The Tribune (Haryana Plus),* Chandigarh Edition, April 13, 2012 p.4

[29] *Ibid.*

have led to stronger regulation, mandated phase-downs, and even bans on some types of field burning. Lawsuits by clean air groups have been filed against individual growers who burn their fields and against state authorities responsible for controlling the practice or protecting air quality.

Agricultural[30] burning can produce a large amount of smoke in a short amount of time. To reduce impacts, permits are usually required before burns can be conducted. These permits can restrict the type and amount of agricultural materials to be burned, and limit burning to those times when air quality and meteorological conditions are most suitable for reducing potential impacts.

SUGGSTIONS

(a) To help find and support non-burning alternatives, economic incentives, and agricultural.

(b) To develop a regional approach involving local, state, and central level to Institutionalize.

(c) Development and implementation of enhanced Smoke Management Programs and banning on burning in night.

(d) Support straw utilization efforts e.g. Fiberboard Plants.

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[30] Agricultural Burning available at http://yosemite.epa.gov/R10/AIRPAGE.NSF/webpage/Agricultural Burning.mht last visited on 26-01-2012.