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How Eco-Friendly Indian Organic Farming Is

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Abstract

The Indian food products are normally considered as organic products due to low synthetic pesticide and moderate synthetic fertilizer usage in farms as well as low probability of synthetic pesticide detection in products. However eco-friendliness of farming process might be assessed in terms of soil erosion rate, mineral contents in soil, and groundcover available to farms for soil conservation. In this paper, in this context, an attempt is made to infer how eco-friendly Indian organic farming is.

Keywords: *Cropland share; Environmental factor for soil's pesticide degrading capacity (EF for SPDC); Ground cover share; Natural Resource enriching Professions; Natural Resource Extractive professions; Organic farming; Soil erosion rate*

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Introduction

The agriculture has been considered among natural resource extractive traditional professions because it leads to erosion of soil and depletion of groundwater and so harm these two natural resources, valuable for itself, if excessively utilizes the land (Horrigan., *et al*. 2002). India is perhaps alone (otherwise one of the few countries) in the world, where as much as half of the landscape and 60% of workforce are devoted to agriculture profession (Sharma and Parisi, 2017a). Nowadays it is often said, Indian farmers have made a departure from heavy synthetic pesticide application way and adopted organic farming. The Indian food products are normally considered as organic products due to low synthetic pesticide and moderate synthetic fertilizer usage in farms as well as low probability of synthetic pesticide detection in products (Sharma and Parisi, 2017b). The question arises whether Indian agriculture, today, is eco-friendly when it covers as high as half of the country landscape. Eco-friendly nature of farming system seems to have concerns with soil fertility and conservation factors like soil erosion rate, mineral contents in soil and surrounding groundcover.

In this paper an attempt is made to somewhat quantitatively infer regarding eco-friendly nature of farming system of India (often called organic farming) in comparison to farming system of another Asian country, having almost similar population, density Japan (often called industrial farming).

Indian Foods as Organic Products

India is tending towards minimization of synthetic pesticide application in farms; a small fraction of worldwide consumption of synthetic pesticides, 3.75% only is shared by India (while USA and Europe share 25 and 45% respectively) with annual (2013-2014) usage value 0.5 kilogram hectare very lesser in comparison to 12 kilogram/hectare of the Asian Country Japan (De., *et al*. 2014). There are data for excessive uses of synthetic fertilizers for the period 2011-15like 1097.8 kilogram/hectare for Kuwait and very low uses like 15.2 kilogram/hectare for Russia, while that for India has been moderate, say 157.8 kilogram/hectare (World Bank data), Therefore there exists a high probability of finding non-detectable (in laboratory test reports) synthetic pesticide residues in food articles say 81.3% as per Indian food samples survey (Express News Service, 2015). However Japan, where pesticide usage is 24 times that of India, also competes in probability of finding non-detectable synthetic pesticide residues in foods, because Indian export food samples seldom face more EU border rejections due to pesticide contents in excess (The RASFF 05-25 January 2016, for example). It means Japan's environmental factor is more vital than that of India due to which soil of Japan has more pesticide degrading capacity than that of India.

Environmental Factor for Soil's Pesticide Degrading Capacity (EF for SPDC)

At this point the author of this paper wants to discuss the parameters required to assess the eco-friendliness of farming process and derive Environmental Factor for Soil's Pesticide Degrading Capacity, EF spdc. These parameters are-

1. Groundcover share:-The groundcover is defined as thickly growing plants or vegetations which cover the ground and protect topsoil from erosion. The grasses are naturally widespread groundcovers. The groundcover layer of a forest greatly contributes to environment ideally suiting to animals particularly reed, warbler, mouse and wren (Harris, 2010). The dense forests with more than 70% canopy cover and mid-dense forests with more than 40% and less than 70% canopy cover (including pastures) contribute a lot to ecology of a country. Its share in country landscape is the most vital eco-parameter. Soil's pesticide degrading capacity or EFspdc seems to be proportional to % Groundcover minus % Bare Soil Area.
2. Cropland and Mining Area share:-After harvesting a crop, the cropland of a country often remains bare till the next crop grows. So it would be appropriate to keep it in bare soil area. Mining area is basically bare soil area and shares a little in landscapes of both the countries Japan and India, hence is excluded.
3. Infrastructure:-The housing infrastructure in Japan is vertical while that in India is almost horizontally expanded. Road infrastructure in Japan is compact enough while Indian roads have loose infrastructure. Japanese infrastructure covers lesser area compared to India due to compactness and perhaps is eco-friendlier. But here the point is how much infrastructure is bare soil area. For simplicity, it is assumed that infrastructure normally should not lead to bare soil area, hence is excluded.
4. Soil Erosion Rate-It is the datum which tells how much soil per hectare per year a country loses due to bare soil area along with rain water and storms. Obviously EFspde should be inversely proportional to soil erosion rate.
5. Mineral contents of soil – The mineral contents of soil are lost due to soil erosion. Therefore this issue seems to be part and parcel of soil erosion rate and hence is excluded.

In this way, Environmental Factor for Soil's Pesticide Degrading Capacity is derived as follows-

EF_{spdc}= K (% Groundcover - % Cropland)/(Soil Erosion Rate)

Where K is the degradation constant with the dimensions $mass^2$ $area^{-2}$ $year^{-2}$ or M^2L^{-4} T^{-2}; so that EF_{spdc} has dimensions ML^{-2} T^{-1} or unit kg per hectare per year.

It is presumed that EFspdc might give an idea of how much pesticide annually applied per hectare is degradable by the soil. As per the latest available eco parameter data EF scope for Japan and India (Statistical Handbook, 2017; USGS Report, 2017, The Hindu, 2010 ISFR, 2017) might be calculated as follows -

EFspdc, japan = K (% GC - % CL)/SER = $2.25x10^3$ (68-12)/$10.5x10^3$

= 12kg /hectare/year

EFspd, India = K (% GC - % CL) /Ser = $2.25x10^3$ (10-55)/$16.4x10^3$

= - 6kg/hectare/year (in round figure)

The value of K is hypothetically assigned to be $2.25x10^3$ kg^2/$hectare^2$/$year^2$

Discussion: How Ecofriendly Indian Organic Farming Is.

The hypothetical value for degradation constant K is based on the hypothesis that Japan fully utilizes soil's pesticide degrading capacity, because soil erosion rates of both the Japan (having 68% dense and mid dense forest cover) and India (having only 10% dense and mid-dense forest cover) are in the range 10-20 tons per hectare per year. Therefore hypothetical value for K is obtained by using equation EFspdc, japan = annual per hectare pesticide application in Japan. However it should also not be forgotten that Japanese archipelago is situated on tectonic plates, seldom giving rise to tsunami which accelerates soil erosion. But it may be safely said that Japan can perhaps effectively reduce soil erosion rate and enrich natural resources if Japanese agriculture adopts traditional or organic way.

As far as Indian organic farming is concerned, its real benefit as soil conservation or reduction of soil erosion rate is not obvious, as it corresponds to negative value of EFspdc. It is indicative of the fact that natural bio-degrading capacity of Indian soil is in continuously lowering phase. In order to make Environmental Factor positive, India's dense and mid-dense forest cover must exceed the cropland area. However if India maintains dense and mid-dense forest cover on at least one-third of its landscape and reduces cropland half from 55% to 27.5%, EFspdc would be 0.8 kg/hectare/year or in order to confirm that currently applied pesticides at the rate 0.5 kg/hectare per year (2012-2014) are degradable. Refraining from natural resource extractive professions and adapting with natural resource enriching professions is the demand of time.

Conclusion

On the basis of the term EFspdc, introduced by the author of this paper, it might be conclusively said that Indian organic farming is currently not eco-friendly in nature. In order to well conserve the soil in India, the dense and mid-dense forest cover should at least be kept 33.33% and cropland be reduced at least half from 55% to 27.5%. In this way Indian soil would be capable to degrade nominal amounts of synthetic pesticides applied in farms.

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