Organic Farming under Paramparagat Krishi Vikas Yogana scheme: A need to address the lack of availability of Farm Yard Manure.

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Organic farming avoids use of external inputs, synthetic fertilizers, pesticides and other harmful chemicals, relies on crop rotations, natural predators, promotes biodiversity, recycles crop residues, animal manure and other organic matter, promotes soil health and fertility, eschews mechanization, and is adapted to local conditions. Conventional agriculture, on the other hand, is characterised by the excessive use of chemicals and mono cropping. The harmful effects of which are degradation of soil, water and environment (Report of the Working Group on Organic and Biodynamic Farming, Planning Commission 2001; Narayanan 2005; Shiva 1991; Greenpeace India Society 2012), adverse effect on the physical, chemical and biological properties of the soil (Narayanan 2005) and depletion of soil micronutrients (Nicolaysen 2012; Shiva 1991; Punjab State Council for Science & Technology 2007). A decline in...
the yield of rice and wheat has been reported in Punjab, in spite of increased use of chemicals (Shiva 1991; Punjab State Council for Science & Technology 2007). Cotton which is the third most important crop in Punjab has been affected by pest and its yield has also declined (Punjab State Council for Science & Technology 2007). Recently, the cotton grown in the states of Haryana, Punjab and Rajasthan has been affected by whitefly infestation. It has been reported that over 95 per cent of the affected crops is hybrid Bt crop (Jitendra 2015). Intensive fertilizer application has led to accumulation of nitrates in the soil, contamination of rivers, lakes, groundwater, wells and other water bodies (Narayana 2005; Greenpeace India Society 2012). Toxic chemicals used in conventional agriculture have also penetrated into our food chain (Committee on Estimates 2015-16).

Organic farming, on the other hand, is more environmentally friendly than conventional farming systems. Organic farming systems have greater soil carbon levels, higher moisture retention, better soil quality (Sharma et al. 2015) and less soil erosion (Howard 1940). Organic farming contains no risk of synthetic pesticide pollution of ground and surface waters (Reganold and Wachter 2016). Under severe drought conditions, organically grown crops have been shown to produce greater yield than conventional crops (Reganold and Wachter 2016). Organic farming is most suitable for low rainfall areas (Sharma et al. 2015). An organic farmer in Tamil Nadu reported that paddy grown by him using organic manures was more resilient during floods (Venkatasubramanian 2015).

**Organic manures:**

Organic manures are necessary to restore soil fertility (Howard 1940). Organic manure provides nutrients to the plant, helps in maintaining C:N ratio in the soil, increases soil fertility and productivity, improves physical, chemical and biological properties of the soil and increases water-retention capacity of the soil (Chandra 2005). The most commonly and traditionally used organic manure in India is farm yard manure (FYM) that is readily available (Chandra 2005; Gaur, Neelakantan and Dargan 1995). Cattle provide good manure and should be an integral part of sustainable agriculture (Greenpeace India Society 2011).

**Farm Yard Manure (FYM):**

Farm Yard Manure is partially composed dung, urine, bedding and straw (Chandra 2005). FYM contains approximately 5 - 6 kg nitrogen, 1.2 - 2.0 kg phosphorus and 5 - 6 kg potash per tonne. The quantity and quality of FYM depend upon the type and age of the animals, feed and the care taken to collect and store the dung. If properly preserved, the quantity of manure that can be produced per animal per year would be as much as four to five tonnes containing 0.5 per cent nitrogen (Chandra 2005). FYM supplies organic matter and nutrients to the soil and increases carbon content in the soil (Singh and Singh 2014; Raj, Jhariya and Toppo 2014). It enhances the physical, chemical and biological properties of the soil (Greenpeace Society International 2011). Manure improves soil tilth, aeration, water-retention capacity of the soil and reduces the bacterial and fungal pathogenic diseases of plants (Raj, Jhariya and Toppo 2014).

A serious concern prevails on the availability of farm yard manure to meet the requirements of organic farming in India. Total farm yard manure available in the country is approximately 1200 million ton including availability of 268 million ton dung from livestock (Singh and Singh 2014) and 50% FYM is used to improve soil fertility while the remaining quantity is used for fuel (Singh and Singh 2014; Reddy et al. 2005). On an average 1.5 - 4.5t ha⁻¹ organic manure was available at farm level in the form of crop residues and animal dung in a survey conducted in low rainfall (below 500 mm year⁻¹) districts of Jodhpur, Nagaur, Pali and Balmer in Rajasthan (Sharma et al. 2015) this is much lower than the recommended 5 to 7t ha⁻¹ in dry areas where the rainfall is low (below 50 cm) (Gaur, Neelakantan and Dargan, 1995).

The shortage of organic manures is well documented. Against a requirement of 710 million tonnes of organic manure, only 105 million tonnes are available (Committee on Estimates 2015-16). The biggest constraint is the insufficiency of animal manure (The Indian Express 2016). A major concern in organic farming is the non-availability of organic inputs such as vermicompost, trichocompost, FYM, amritpanI, biofertilisers (Report of the Working Group on Organic and Biodynamic Farming, Planning Commission 2001). In a survey conducted by Greenpeace, it was found that 72.9% of respondents stated that reasons for not using organic matter was its unavailability (Greenpeace Society International 2011). The number of livestock owned by a farmer has a direct impact on the availability of cow dung, which in turn, influences the consumption of agrochemicals (Singh and Singh 2004).
Suggestions to increase organic manure:-
1. The rearing of livestock is imperative for increasing organic manure (Committee on Estimates 2015-16; Report of the Working Group on Organic and Biodynamic Farming, Planning Commission 2001; The Indian Express 2016).
2. Production and sale of compost, organic manure and micro nutrients should be encouraged on a large scale through informal as well as, organized production systems by providing appropriate incentives (Report of the Steering Committee on Agriculture and Allied sectors for formulation of the Eleventh Five Year Plan, Planning Commission 2007).
3. Feed of livestock is one of the determining factors of the quality of FYM (Chandra 2005; Gaur, Neelakantan and Dargan 1995). Making available fodder crops and increasing the availability of permanent pasture land would lead to fewer cattle deaths and better quality of manure (Pandey and Singh 2012; Report of the Working Group on Organic and Biodynamic Farming, Planning Commission 2001). In India, the area under permanent pastures is rapidly declining (Pandey and Singh 2012). In 2005-06 the area under permanent pastures and other grazing land was 10,444,000 hectares which declined to 10,301,000 hectares in 2010-11, a decline of 1.39%. The area under fodder crops was 8,066,000 hectares in 2005-06 and declined to 7,769,000 hectares in 2010-11, a decrease of 3.82% (Basic Animal Husbandry Statistics 2014).
4. Kraaling of cattle is followed in Nepal, parts of Indian Himalayas (Singh and Gaur 2013) and in semiarid Africa south of the Sahara (Powell and Ipke 1992). The urine and dung excreted by the cattle on the fields helps in restoring soil fertility. It was found that the yield of millets in plots that were kraaled was 2.3 times higher than when only manure was applied (Powell and Ipke 1992).
5. Cattle that are not productive or old can be used for the production of dung and urine. The animals may not give milk but provide manure in substantial quantity. Cattle provides 4.6 to 11 kg ha⁻¹ year⁻¹ nitrogen through urine (Sharma et al. 2015).
6. Subsidies and incentives should be given to farmers for maintaining cattle (Report of Task Force on Organic Farming, 2001), particularly those that have become old and unproductive.

Conclusion:-
The environmental and health benefits of organic farming are widely recognized and the market for organic products is huge and growing annually. The Government of India, has rightly evinced interest in promoting organic farming under the flagship scheme, Paramparagat Krishi Vikas Yogana. But there is concern that the targets for organic farming may not be achieved due to impediments, such as, lack of organic manures and marketing (Ong Kung Wai 2016). The shortage of organic manure can be overcome to a large extent by providing suitable subsidies and incentives for rearing and maintaining cattle, thereby, increasing the availability of farm yard manure.

References:-
1. Chandra Krishan ( 2005): Organic Manures, Regional Centre of Organic Farming, Bangalore. Retrieved on April 4, 2016 from http://ncoc.dacnet.nic.in/Training_manuals/Training_manuals_in_English/organicmanures.pdf.
2. Committee on Estimates (2015-16): "National Project on Organic Farming," Ministry of Agriculture, (Department of Agriculture & Cooperation) Ninth Report, Sixteenth Lok Sabha, New Delhi: Government Press.
3. Gaur, A.C, S. Neelakantan and K.S. Dargan (1995): Organic Manures, Indian Council of Agricultural Research, New Delhi.
4. Greenpeace India Society (February, 2011): Of soils, subsidies and survival: A report on living soils retrieved on April 4, 2016 from http://www.greenpeace.org/india/Global/india/report/Living%20soils%20report.pdf.
5. __________(2012): "Fertilizer, fuel and food: Win-Win options for Bihar" retrieved on April 4, 2014 from http://www.greenpeace.org/india/Global/india/report/Bihar-Living-soils-report.pdf.
6. Howard, Sir Albert (1940): An Agricultural Testament, Research Foundation for Science, Technology and Ecology, New Delhi.
7. The Indian Express (2016, February 29): "Union Budget 2016: Here's what Arun Jaitley announced for farm sector". Retrieved February 29, 2016 from http://indianexpress.com/article/business/budget/union-budget-2016-arun-jaitley-farm-sector-farmers/
8. The Indian Express (2016, March 2): Centre gives push to organic farming even as Punjab lags - http://indianexpress.com/article/cities/chandigarh/centre-gives-push-to-organic-farming-even-even-as-punjab-lags/#sthash.yTX6QT9e.dpuf accessed on March 11, 2016.
9. Jitendra (1-15 November, 2015): "Whitefly lesson", *Down to Earth*, pp 14-16.
10. Ministry of Agriculture, Department of Agriculture and Cooperation (2001): Report of Task Force on Organic Farming, November 2001.
11. Department of Animal Husbandry, Dairying and Fisheries (2014): Basic Animal Husbandry Statistics.
12. Ministry of Environment and Forests, Punjab State Council for Science & Technology, Chandigarh (2007): "State of Environment Punjab".
13. Narayanan, S (2005): "Organic farming in India: Relevance, problems and constraints," Occasional Paper -38, Department of Economic Analysis and Research, National Bank for Agriculture and Rural Development.
14. Nicolaysen, A.M (2012): *Empowering small farmers in India through organic agriculture and biodiversity conservation* University of Connecticut, Ph.D, Dissertation.
15. Ong Kung Wai (2016): *Organic Asia 2015 The World of Organic Agriculture, Statistics and Emerging Trends 2015*. FiBL-IFOAM Report, Research Institute of Organic Agriculture (FiBL), Frick and IFOAM - Organic International, Bonn (pp 172-181)
16. Pandey, Jitendra, and Ashima Singh (2012): "Opportunities and Constraints in Organic Farming: An Indian Perspective," Journal of Scientific Research, Banaras Hindu University, Varanasi, Vol 56, 2012, pp 47-72
17. PIB (2015): Press Information Bureau Release dated 24-April-2015. "Promoting Organic Farming" http://pib.nic.in/newsite/PrintRelease.aspx?relid=118622 Retrieved on March 14, 2015.
18. Planning Commission (2001): Report of the Working Group on Organic and Biodynamic Farming, For the Tenth Five Year Plan.
19. __________(2007): Report of the Steering Committee on Agriculture and Allied sectors for formulation of the Eleventh Five Year Plan (2007-12), April 15, 2007.
20. Powell, Mark and Felix Ikpe (October 1992): "Fertilizer factories", Centre for Learning on Sustainable Agriculture, (ILEIA) Newsletter, volume 8, No.3, pp13-14 from www.agriculturesnetwork.org/magazines/global/livestock- sustaining-livelihoods/fertiliser-nutrient-recycling-through accessed on March 31, 2016.
21. Raj, Abhishek, Manoj Kumar Jhariya, Pratap Toppo (October 2014): "Cow dung for ecofriendly and sustainable productive farming", International Journal of Scientific Research, Vol 3, Issue 10, pp 201-02.
22. Reddy K.S., N. Kumar, A. K. Sharma, C. L. Acharya, R. C. Dalal (23 May, 2005): "Biophysical and sociological impacts of farmyard manure and its potential role in meeting crop nutrient needs: a farmers’ survey in Madhya Pradesh, India". Australian Journal of Experimental Agriculture, 45(4) 357–367 doi:10.1071/EA03225.
23. Reganold, John P and Jonathan M. Wachter (February 2016): *Organic agriculture in the twenty-first century, Nature Plants*, Vol. 2, pp 1-8. DOI:10.1038/NPLANTS.2051.22.
24. Sharma, A.K., Patel, N., Painuli, D.K. and Mishra, D (2015): "Organic Farming in Low Rainfall Areas". Central Arid Zone Research Institute, Jodhpur.
25. Shiva, Vandana (1991): *The Violence of the Green Revolution: Agriculture, Ecology and Politics in the South*, Dehradun: Natraj Publishers.
26. Singh, Deepa Dasila, and Netra Pal Singh (2004): *Agrochemical Usage Pattern in the Vegetable Belts of Uttarakhand. Study Conducted for Center for Organic Farming (COF) Part 2 - Himothan Pariyojna, UOCB, Dehradun.*
27. Singh, R.C, and C.D. Singh (30 October 2014): "Design and development of an animal drawn farmyard manure spreader", African Journal of Agricultural Research, Vol 9 (44), pp 3245-3250. DOI: 10.5897/AJAR2013.8337
28. Singh, Vir and R.D. Gaur (2013): *Rangeland Ecosystems in the Himalayan Mountains*, Delhi: Daya Publishing House.
29. Venkatasubramanian V (December 21, 2015): Crops raised with organic manure survive inundation, The Hindu.
30. Willer, Helga and Julia Lernoud (Eds) (2015): *The World of Organic Agriculture, Statistics and Emerging Trends 2015*. FiBL-IFOAM Report, Research Institute of Organic Agriculture (FiBL), Frick and IFOAM - Organics International, Bonn.
31. __________(2016): *The World of Organic Agriculture, Statistics and Emerging Trends 2016*. FiBL-IFOAM Report, Research Institute of Organic Agriculture (FiBL), Frick and IFOAM - Organics International, Bonn.
32. Yadav S.K, Subhash Babu, M.K. Yadav, Kalyan Singh, G.S. Yadav and Suresh Pal (2013): "A Review of Organic Farming for Sustainable Agriculture in Northern India", International Journal of Agronomy, Volume 2013, DOI:10.1155/2013/718145