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Challenges in Sustainable Development of Agriculture Sector: an Indian Scenario

**Prasenjit Mondal^{1,a}, Soumyadeep Baksi^{1,b}, K. Dharni Kumar^{1,c},
Debajyoti Bose^{2,d}**

¹Department of Health, Safety & Environmental Engineering,
University of Petroleum and Energy Studies, Dehradun, India

²Department of Electrical, Power & Energy, University of Petroleum and Energy Studies,
Dehradun, India

^{a-d}E-mail address: pmondal@ddn.upes.ac.in , sbaksi@ddn.upes.ac.in ,
dharni.kumar@ddn.upes.ac.in , dbose@ddn.upes.ac.in

ABSTRACT

Sustainable Agriculture innovations include least soil unsettling influence, lasting soil cover through yield deposits or cover harvests, and yield revolutions for accomplishing higher profitability. In India, endeavors to create refine and scatter preservation based farming advancements have been in progress for almost two decades and gained huge ground from that point forward despite the fact that there are a few imperatives that influence Sustainable Agriculture. Especially, huge endeavors have been made on no-till in wheat under a rice-wheat pivot in the Indo-Gangetic fields. There are a greater number of settlements than tradeoffs for selection of Sustainable Agriculture be that as it may; the balance among the two was comprehended by both adopters and promoters. The advances of Sustainable Agriculture give chances to decrease the cost of generation, spare water and supplements, increment yields, increment trim expansion, enhance effective utilization of assets, and advantage the earth. Nonetheless, there are still requirements for advancement of Sustainable Agriculture advances, for example, absence of suitable seeders particularly for little and medium scale agriculturists, rivalry of yield buildups between Sustainable Agriculture utilize and domesticated animals sustaining, blazing of yield buildups, accessibility of talented and logical labor and conquering the inclination or outlook about culturing. The need to build up the arrangement Sustainable Agriculture sing and procedures is pressing to advance Sustainable Agriculture in the district. This article audits the developing worries because of constant selection of ordinary farming frameworks, what's more, examinations the

imperatives, prospects, arrangement issues and research requirements for preservation Agriculture in India.

Keywords: Sustainable Agriculture; Zero Tillage; Traditional Agriculture; Efficiency of Energy Use etc.

1. INTRODUCTION

Accomplishing sustenance security for a developing populace and mitigating destitution while supporting agricultural frameworks under the present situation of exhausting regular assets, negative effects of climatic changeability, spiraling expense of information sources and unpredictable sustenance costs are the real difficulties before the greater part of the Asian nations. In expansion to these difficulties, the important pointers of non-manageability of horticultural frameworks incorporate: soil disintegration, soil natural matter decrease, and salinization. These are brought on for the most part by:

- a) Escalated culturing prompted soil natural matter decrease, soil basic debasement, water and wind disintegration, lessened water penetration rates, surface fixing and crusting, soil compaction
- b) Inadequate return of natural material, and
- c) Mono-cropping

Consequently, an outlook change in cultivating hones through disposing of unsustainable parts of customary Agriculture (furling/working the dirt, expelling all natural material, monoculture) is significant for future profitability picks up while maintaining the common assets. Preservation farming (sustainable agriculture), an idea developed as a reaction to worries of supportability of agribusiness all inclusive, has relentlessly expanded worldwide to cover about ~8% of the world arable land (124.8 M ha).

Sustainable agriculture is an asset sparing horticultural generation framework that intends to accomplish generation strengthening and exceptional returns while improving the characteristic asset base through consistence with three interrelated standards, alongside other great generation practices of plant nourishment and bother administration (Zhang, Yan et al. 2016). Conventional agribusiness, in light of culturing and being exceedingly automated, has been blamed for being in charge of soil disintegration issues, surface and underground water contamination, and more water utilization (Wolff and Stein, 1998).

Additionally, it is involved in land asset debasement, untamed life and biodiversity decrease, low vitality effectiveness and commitment to an unnatural weather change issues (Tsitsimpelis, Wolfenden et al. 2016).

Subsequently, preservation agribusiness (sustainable agriculture) is an approach to develop yearly and enduring products, in light of no vertical annoyance of soil (zero and preservation culturing), with harvest buildup administration and cover crops, keeping in mind the end goal to offer a changeless soil cover and a characteristic increment of natural matter substance in surface skylines.

The primary natural results of this technique have been explored worldwide with the goal of introducing a blend of the accessible studies and reports to the ranchers and established researchers.

It focuses on the precise valuable effects of a moderate method for development on the worldwide environment (soil, air, water and biodiversity), contrasted with customary Agriculture (Pandey, Vaddella et al. 2016).

Assist, it moreover presents the genuine crevices or vulnerabilities concerning the researchers' positions on these ecological perspectives. Sustainable agriculture elevates most soils to have a wealthier bioactivity and biodiversity, a superior structure and attachment, and a high characteristic physical assurance against climate (raindrops, wind, dry or wet periods). Soil disintegration is along these lines exceedingly decreased, soil agronomic information sources transport marginally diminished, while pesticide bio-corruption is upgraded. It shields surface and ground water assets from contamination furthermore mitigates negative atmosphere impacts. Thus, sustainable agriculture gives fabulous soil ripeness furthermore spares cash, time and fossil-fuel. It is a proficient other option to customary agribusiness, weakening its downsides.

2. TARGETS OF SUSTAINABLE AGRICULTURE

Protection farming is an administration framework that keeps up a dirt cover through surface maintenance of edit deposits with no till/zero and lessened culturing. Sustainable agriculture is portrayed by FAO as an idea for asset sparing agrarian yield creation which depends on upgrading the normal and organic forms above and beneath the ground. According to (Papadopoulos, Karelakis et al. 2015) protection Agriculture is definitely not "the same old thing", in light of boosting yields while abusing the dirt and agro-biological community assets. Or maybe, sustainable agriculture depends on advancing returns and benefits, to accomplish an adjust of rural, monetary and ecological benefits. It advocates that the joined social and monetary advantages picked up from consolidating creation and ensuring the earth, including diminished info and work expenses, are more prominent than those from creation alone.

With sustainable agriculture, cultivating groups get to be suppliers of more sound living situations for the more extensive group through diminished utilization of fossil powers, pesticides, and different contaminations, and through protection of ecological honesty and administrations. According to FAO definition sustainable agriculture is to:

1. Accomplish worthy profits
2. High and supported generation levels, and
3. Moderate the earth.

It goes for switching the procedure of debasement intrinsic to the traditional farming practices like concentrated Agriculture, smoldering/expulsion of harvest buildups. Subsequently, it plans to moderate, enhance and make more productive utilization of normal assets through coordinated administration of accessible soil, water and natural assets consolidated with outer information sources. It can likewise be alluded to as asset proficient or asset viable farming. Protection agribusiness frameworks require an aggregate outlook change from customary Agriculture as to administration of yields, soil, water, supplements, weeds, and ranch hardware (Table 1).

Table 1. Comparison of Traditional and Sustainable agriculture.

Traditional agriculture	Sustainable agriculture
Developing area, utilizing science and innovation to rule nature	Minimum impedance with characteristic procedures
Extreme mechanical culturing and soil disintegration	No-till or definitely lessened culturing (organic culturing)
High wind and soil disintegration	Low wind and soil disintegration
Deposit smoldering or evacuation (uncovered surface)	Surface maintenance of deposits (forever secured)
Water invasion is low	Invasion rate of water is high
Utilization of ex-situ FYM/fertilizers	Utilization of in-situ organics/fertilizers
Green manuring (consolidated)	Cocoa manuring/cover crops (surface maintenance)
Free-wheeling of ranch hardware, expanded soil compaction	Controlled movement, compaction in tramline, no compaction in harvest range

3. POSITIVE SIDES OF SUSTAINABLE AGRICULTURE

Appropriation and spread of ZT wheat has been an example of overcoming adversity in North-western parts of India due to:

1. Decrease in cost of generation by Rs 2,000 to 3,000 ha⁻¹ (\$ 33 to 50) (Chen and Zhang 2015)
2. Improvement of soil quality, i.e. soil physical, substance and organic conditions (Cupiał, Szelağ-Sikora et al. 2015)
3. Improvement, in the long haul C sequestration and develop in soil natural matter constitute a useful methodology to relieve Green House Gas emanations and confer more prominent flexibility to generation frameworks to environmental change related deviations (Tsuchiya, Hara et al. 2015)
4. Lessening of the occurrence of weeds, for example, Phalaris minor in wheat (Feola, Lerner et al. 2015)
5. Upgrade of water and supplement utilize proficiency (Saharawat, Ladha et al. 2012)
6. Improvement of creation and profitability (4% – 10%) (Gathala, Ladha et al. 2011)
7. Decrease in nursery gas outflow and moved forward natural manageability (Pathak, Bhardwaj et al. 2011)
8. Keeping away from harvest buildup blazing decreases loss of supplements, what's more, natural contamination, which decreases a genuine wellbeing danger (Woodruff, Boushey et al. 2007)

9. Giving open doors for yield expansion and strengthening for instance in sugar cane based frameworks, mustard, chickpea, pigeonpea and so on. (Woodruff, Boushey et al. 2007)
10. Change of asset utilize productivity through buildup deterioration, soil basic change, expanded reusing and accessibility of plant supplements (Jat, Gathala et al. 2009) and
11. Utilize surface buildups as mulch to control weeds, direct soil temperature, diminish dissipation, what's more, enhance natural movement (Huang, Tichit et al. 2015).

In light of the ZT wheat benefits, the sustainable agriculture based harvest administration advancements have been attempted in other editing frameworks in India (Mehmood, Waqas et al. 2015), yet there are vast learning crevices in sustainable agriculture based advances which demonstrates there is a need to create, refine, popularize and disperse these innovations on an expansive scale. Zero culturing is an innovation where the product is sown in a solitary tractor operation utilizing an extraordinarily composed seed-cum-compost penetrates with no field readiness without tied down buildup at ideal to marginally wetter soil dampness administrations. Encounters from a few areas in the Indo-Gangetic fields demonstrated that with zero culturing innovation ranchers could save money ashore arrangement costs by about Rs. 2,500 (\$41.7) per ha and decrease diesel utilization by 50 – 60 liters for each ha (Verma, Jaiswal et al. 2015). Zero culturing permits auspicious sowing of wheat, empowers uniform boring of seed, enhances manure utilize proficiency, spares water and expands yield up to 20%. Achievement has additionally been accomplished in bed planting of wheat, cotton and rice. This has brought about investment funds in water system water, enhanced manure utilize and decreased soil crusting.

4. FEATURES OF SUSTAINABLE AGRICULTURE

The course that Asian nations take to meet their sustenance and vitality needs amid the coming decades will impacts affect common asset bases, worldwide environmental change and vitality security for India, Asia and the world. These difficulties attract regard for the need and desperation to address choices by which dangers to Indian/Asian agribusiness because of regular asset corruption, heightening creation expenses and environmental change can be met effectively. A move to no-till preservation Agriculture is seen to be of much basic esteem in meeting these difficulties. Asian ranchers/specialists will keep on needing help to reorient their farming furthermore, hones for delivering more with less cost through selection of less helpless decisions and pathways. Hence, nothing new with routine farming practices does not appear a maintainable choice for supportable picks up in nourishment grain generation and henceforth sustainable agriculture-based product administration arrangements adjusted to neighborhood requirements will need to assume a basic part in most environmental and financial settings of Asian Agriculture. The advancement of sustainable agriculture under Indian/Asian setting has the accompanying prospects:

- i. ***Reduction in cost of creation*** – This is a key component adding to quick reception of zero-till innovation. Most studies demonstrated that the cost of wheat creation is diminished by Rs. 2,000 to 3,000 (\$ 33 to 50) per hectare. Taken a toll decrease is

- credited to funds by virtue of diesel, work and info costs, especially herbicides (Palencia-Aguilar 2015).
- ii. **Reduced occurrence of weeds** – Most studies have a tendency to demonstrate decreased rate of *Phalaris minor*, a signify Sustainable Agriculture weed in wheat, when zero-culturing is embraced bringing about lessened being used of herbicides (Bzowska-Bakalarz, Trendak et al. 2015).
 - iii. **Saving in water and supplements** – Limited test results and ranchers encounter demonstrate that extensive sparing in water (up to 20% – 30%) and supplements are accomplished with zero-till planting and especially in laser leveled and bed planted products. (Landgraf, Rusu et al. 2007) expressed that higher soil water content under no-till than under traditional culturing demonstrated the lessened water dissipation amid the previous period. They too found that crosswise over developing seasons, soil water content under no-till was around 20% more noteworthy than under conventional culturing.
 - iv. **Increased yields** – In appropriately oversaw zero-till planted wheat, yields were perpetually higher analyzed to customarily arranged fields for practically identical planting dates. Sustainable agriculture has been accounted for to improve the yield level of edits because of related impacts like counteractive action of soil debasement, enhanced soil fruitfulness, enhanced soil dampness administration (because of expanded rain water penetration, water holding limit and decreased dissipation misfortune) and yield rotational advantages. Yield increments as high as 200 – 500 kg ha⁻¹ are found with no-till wheat contrasted with traditional wheat under a rice-wheat framework in the Indo-Gangetic fields (Niemmanee, Kaveeta et al. 2015). Audit of the accessible writing on sustainable agriculture gives blended signs of the impacts of sustainable agriculture on harvest profitability. While a few thinks about claim that sustainable agriculture brings about higher and steadier harvest yields (African Conservation Tillage Network, 2011), then again there are additionally various cases of no yield benefits and even yield diminishments especially amid the underlying years of sustainable agriculture selection.
 - v. **Environmental advantages** – Conservation farming including zero-till and surface oversaw edit deposit frameworks are an amazing chance to wipe out blazing of harvest buildup which add to expansive measures of nursery gasses like CO₂, CH₄ and N₂O. Smoldering of harvest buildups, additionally add to significant loss of plant supplements, which could be reused when legitimately oversaw. Extensive scale blazing of harvest buildups is likewise a genuine wellbeing risk.
 - vi. **Crop expansion openings** – Adopting Conservation Agriculture frameworks offers openings for product expansion. Trimming successions/pivots and agroforestry frameworks when received in appropriate spatial and transient examples can advance upgrade regular biological procedures. Constrained studies show that an assortment of products like mustard, chickpea, pigeonpea, sugar cane, and so forth, could be very much adjusted to the new frameworks.
 - vii. **Resource change** – No culturing when joined with surface administration of product deposits starts the procedures whereby moderate decay of buildups results in soil auxiliary change and expanded reusing and accessibility of plant supplements. Surface deposits going about as mulch, direct soil temperatures, decrease vanishing, and enhance organic movement.

5. REQUIREMENTS FOR SUSTAINABLE AGRICULTURE

A mental change of agriculturists, experts and analysts far from soil corrupting culturing operations towards manageable creation frameworks like no culturing is important to get changes in demeanors of agriculturists (Wu, Wu et al. 2015). (Petrache, Rodino et al. 2015) notwithstanding, noticed that likely the most vital calculate the selection of sustainable agriculture is beating the predisposition or attitude about culturing. It is contended that persuading the ranchers that effective development is conceivable even with decreased culturing or without culturing is a noteworthy obstacle in advancing sustainable agriculture on a huge scale. Much of the time, it might be hard to persuade the agriculturists of potential advantages of sustainable agriculture past its potential to decrease generation costs, principally by culturing diminishments. Sustainable agriculture is presently, viewed as a course to supportable agribusiness. Spread of preservation agribusiness, in this way, will call for logical research connected with advancement endeavors. The accompanying is a couple of essential imperatives which block expansive scale selection of sustainable agriculture.

- Lack of proper seeders particularly for little and medium scale agriculturists: Although critical endeavors have been made in creating and advancing apparatus for seeding wheat in no till frameworks, fruitful selection will Call for quickened exertion in creating, institutionalizing and advancing quality apparatus went for a scope of product and editing arrangements. These would incorporate the improvement of changeless quaint little inn planting frameworks and collect operations to oversee edit deposits.
- The across the board utilization of product buildups for domesticated animals sustain and fuel: Specially under rain fed circumstances, ranchers confront a shortage of harvest deposits because of less biomass creation of various products. There is rivalry between sustainable agriculture practice and domesticated animals sustaining for product buildup. This is a noteworthy imperative for advancement of sustainable agriculture under rain fed circumstances.
- Burning of yield deposits: For convenient sowing of the following product and without apparatus for sowing under sustainable agriculture frameworks, agriculturists like to sow the harvest in time by smoldering the buildup. This has turned into a typical highlight in the rice-wheat framework in north India. This makes ecological issues for the district.
- Lack of information about the capability of sustainable agriculture to Agriculture pioneers, expansion operators and agriculturists: This infers that the entire scope of practices in protection agribusiness, including planting and gathering, water and supplement administration, maladies and irritation control and so on should be advanced, assessed and coordinated with regards to new frameworks.
- Skilled and logical labor: Managing preservation farming frameworks will call for improved limit of researchers to address issues from a frameworks point of view and to have the capacity to work in close associations with ranchers and different partners. Fortified learning and data sharing components are required.

6. CHALLENGES IN DEVELOPMENT OF SUSTAINABLE AGRICULTURE

Protection Agriculture as an up and coming worldview for raising products will require a creative framework point of view to manage assorted, adaptable and setting particular needs of advancements and their administration.

Preservation farming R&D (Research and Development), in this manner will require a few inventive elements to address the test. Some of these are:

- A. ***Understanding the framework*** – Conservation farming frameworks is a great deal more unpredictable than ordinary frameworks. Site particular information has been the primary confinement to the spread of sustainable agriculture framework (Fatkhiafi, Tjiptoherijanto et al. 2015). Dealing with these frameworks proficiently will be profoundly requesting as far as comprehension of fundamental procedures and segment connections, which decide the entire framework execution. For instance, surface kept up product deposits go about as mulch and along these lines decrease soil water misfortunes through dissipation and keep up a direct soil temperature administration (Gopal, Jat et al. 2010). In any case, in the meantime edit buildups offer an effortlessly decomposable wellspring of natural matter and could harbor undesirable nuisance populaces or modify the framework biology in some other way. No-culturing frameworks will impact profundity of entrance and dissemination of the root framework which, thusly, will impact water and supplement take-up and mineral cycling. Along these lines the need is to perceive preservation farming as a framework and create administration methodologies.
- B. ***Building a framework and cultivating framework point of view*** – A framework viewpoint is assembled working in association with ranchers. A center gathering of researchers, ranchers, augmentation specialists and different partners working in association mode will in this manner be basic in creating and advancing new innovations. This is to some degree unique in relation to in customary rural R&D, the framework is to set research needs and allot assets inside a structure, and little consideration is given to construct connections and look for linkages with accomplices working in integral fields.
- C. ***Technological difficulties*** – While the essential standards which shape the establishment of protection agribusiness rehearses, that is, no culturing and surface oversaw edit buildups are surely knew, selection of these rehearses under fluctuating cultivating circumstances is the key test. These difficulties identify with improvement, institutionalization and selection of homestead apparatus for seeding with least soil unsettling influence, creating crop collecting and administration frameworks.
- D. ***Site specificity*** – Adapting methodologies for preservation farming frameworks will be very site particular, however learning over the locales will be a capable path in understanding why certain innovations or practices are powerful in an arrangement of circumstances and not successful in another set. This learning procedure will quicken building a learning base for reasonable asset administration.
- E. ***Long-term examine point of view*** – Conservation agribusiness rehearses, e.g. no-culturing and surface- kept up yield buildups result in asset change just slowly, and advantages come to fruition just with time.

In reality by and large, benefits as far as yield increment may not come in the early years of assessing the effect of protection Agriculture hones. Understanding the progression of changes and collaborations among physical, compound and natural procedures is essential to creating enhanced soil-water and supplement administration systems (Abrol and Sangar 2006). Hence, investigate in protection agribusiness must have longer term viewpoints.

7. CONCLUSION

Sustainable Agriculture offers another worldview for farming innovative work not quite the same as the traditional one, which for the most part went for accomplishing particular sustenance grains creation focuses in India. A move in worldview has turned into a need in perspective of boundless issues of asset debasement, which went with the past systems to improve creation with little sympathy toward asset respectability. Coordinating worries of profitability, asset protection and soil quality and nature is presently major to maintained efficiency development. Creating and advancing maintainable horticulture frameworks will be very requesting as far as the information base. This wills Sustainable Agricultural for incredibly upgraded limit of researchers to address issues from a frameworks viewpoint; have the capacity to work in close organizations with ranchers and different partners and fortified learning and data sharing systems. Preservation Agriculture offers an open door for capturing and turning around the descending winding of asset corruption, diminishing development expenses and making farming more assets – utilize effective, focused and practical. "Rationing assets – upgrading profitability" must be the new mission.

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