

1 REVIEW OF GREEN TECHNOLOGIES USE BY FARMERS: IMPLICATIONS FOR 2 ENVIRONMENTAL SUSTAINABILITY IN NIGERIA

3 *Abstract*

4 **Background:** The study reviewed green technologies used by farmers. It specifically reviewed what green
5 technology is all about in farming; green technologies used by farmers and its role on environmental
6 sustainability and challenge to use of green technology in farming. **Materials and Methods:** The author
7 reviewed books, journals, bulletin... theses, dissertations, research reports...etc. **Results:** Findings show
8 that solar photovoltaic, wind energy, biofuel, biogas, biomass, organic farming, integrated pest management,
9 mixed farming, etc. are the most common green technologies use by farmers in Nigeria. The findings further
10 showed that the adverse effect of conventional technology and modern farming practice on the natural
11 environment were environmental degradation, global warming, climate change, reduction in biodiversity,
12 destruction of soil health and natural habitat, economic loss to farmers, which can be addressed by green
13 technologies use with its potentials of healing damaged natural environments and ensuring profitability as
14 cost of production is reduced by 67% and sustainability of environment in the production process. The
15 benefits of green technologies are quality natural environment, healthy farm produce and sustainable
16 biodiversity while challenges to its use are cost intensive, lack of technical know-how, illiteracy of the
17 farmers, inadequate information on the potentials and limitation of its application. Green technology is the
18 path of rapid agricultural development and welfare improvement as it increases profitability and health of
19 farmers and guarantees environmental sustainability. The study recommends policy measures promoting use
20 of green technologies by farmers for environmental sustainability and profit maximization.

21 **Keywords:** Green Technologies, Farmers, Environment, Sustainability, Nigeria, Profit Maximization, Global
22 warming, Climate Change, Organic Farming.

23 INTRODUCTION

24 Agriculture is the most practice profession in Nigeria. It is the integral part of man for his existence as he
25 depends on it for provision of food, shelter, meat, medicine, etc. for himself and families, and it's the key
26 source of income to about 80% of rural dwellers [1]. In the early period when the population was smaller,
27 resources were abundant and there was enough to eat without so much concern about processing and storage,
28 and agricultural production was basically based on cycling and recycling of nutrient between plant biomass,
29 organic and inorganic soil stores[2]. At that period there was enough to eat and the populace lived healthier
30 and longer as the production was eco-friendly.

31 As the population grew, limitation in natural resources aroused and this pushed man to craving for
32 industrialization in agriculture in order to produce enough food for the growing population[2]. Based on that,
33 agricultural production developed with the use of off-farm inputs such as inorganic fertilizer, agro-chemicals
34 for pest and weeds control which aided increase in productivity but with serious side-effect that lasted than
35 its benefit to the environment and man, making the entire ecosystem unsustainable[3]. Some of the serious
36 environmental problem as result of these agricultural production techniques include but not limited to
37 reduction in biodiversity, aquatic eutrophication by nitrogenous and phosphorus substances caused by
38 over-fertilization, global warming caused by enteric fermentation and use of fossil fuel, water shortage due
39 to irrigation, eco toxicity, human effects, etc.[2]. Owais, Sushree & Singh (2018) also noted that the use of
40 chemical and the prevalent farming practices result to environmental hazards such as damage of soil health
41 and natural habitat, soil salinization, reduce ground water level, soil erosion, decreased food quality,
42 pollution due to fertilizer and high cost of cultivation rendering farmer poorer year after year[4]. This is in

43 line with my position as it damages the natural environment and renders the environment unsustainable and
44 even affect farmer up to the point of affecting his health and income.

45 The practice of the use of off-farm inputs were basically for the increase of food productivity to feed the
46 growing population but over 14 million people in Nigeria are still malnourished[5], and instead of increasing
47 farming productivity to cater for rapid growing population in the country, it is increasing the damage of the
48 natural environment making it unfavorable and unsustainable.

49 Achieving food security mainly depends on efficient farming practices that will not only concerned about
50 increase in food productivity but also concerned with not subjecting environment to ecological problems
51 such as soil degradation, climate change, erosion while farming [6]. The growing awareness of the negative
52 impact of the use of off-farm inputs in farming is causing a shift among consumers, policy maker and even
53 producers to desiring efficient and environmental friendly method in agricultural practices.

54 Green technology is an alternative practice which assures reduction of environmental damage leading to
55 higher farm profit and protecting natural resources [4]. It increases the productivity with no damage to the
56 environment[3], and that's the same purpose of the use of off-farm inputs but it in turn causes damage to the
57 environment which renders it unfavorable to mankind. Green technology practice in agriculture increases
58 environmental sustainability because it produces high quality organic food from a high quality
59 environment[4].

60 **1.2 Statement of the Problem**

61 The large share of Nigeria population dwell in the rural area and their major occupation is agriculture. This
62 implies that they largely depend on agriculture for the provision of their basic need such as food, shelter,
63 income, medicine, etc. Earlier before advancement in agricultural practices as result of urbanization and
64 rapid population growth, agricultural production was basically by cycling and recycling soil nutrient and
65 waste product into soil to increase soil fertility to aid agricultural productivity. This particular practice was
66 eco-friendly because it helped in preservation of natural environment while trying to increase agricultural
67 productivity.

68 As population grow and urbanization on rapid increase; resources depletion became high leading to scarcity,
69 and it became necessary to utilize the relative scarce resources such as land to ensure production of enough
70 food for the growing population which necessitated the use of all kinds of off-farm inputs to increase
71 productivity per area of land as against earlier practice which increases productivity by increasing area of
72 cultivated land. At this point, the uttermost concern is increase in production without concern about the
73 environment. The use of the off- farm input actually increased productivity but not as fast as population
74 growth yet the negative impact last longer than the benefit. Indiscriminate use of chemicals and conventional
75 agricultural practices yielded to so many environmental hazards such as water pollution, decreased food
76 quality, damage of soil health, soil erosion, soil salinization, reduced ground water level, and even lead to
77 increase in cost of cultivation. The reduction in the food quality has rendered food produced with off-farm
78 inputs unpreservable and unhealthy for human consumption.

79 Based on the growing awareness of the negative impact of the use of all kinds chemical and conventional
80 agricultural practices on the environment and man; the producers and consumers are seeking for a healthy
81 food produced on a healthy environment that is fit for consumption and preservable. Then, it becomes
82 necessary to identify and understand eco-friendly agricultural practices preferably known as "Green
83 Technology" that will aid productivity and profitability of agricultural production without damage to the
84 natural environment and mankind, rather heals already caused damage.

85

86 **1.3 Objectives of the Study**

87 The overall objective of the study is to review the current green technologies use by farmers and how it
88 affects environment while the specific objectives are to;

- 89 i. recognize what green technology is all about.;
- 90 ii. assess green technologies used by farmers and its role on environmental sustainability, and
- 91 iii. highlight challenges in using green technology in farming.

92 **LITERATURE REVIEW**

93 **2.1 Green Technology**

94 Technology is basically, the application of scientific knowledge for the purpose of manipulation of the
95 human environment to satisfy the changing desire of man. In this context, technology allows people to
96 achieve things that are not easy or possible. There are many kinds of technology which exist, but, most of
97 these have no consideration on the environment it's been used to manipulate or its sustainability for the
98 benefit of the future generation. Hence, green technology is a kind of technology that considers the
99 environment and its sustainability.

100 Green technology is any product, system or methods that are used to conserve natural environment and
101 resources which reduces negative impact of human activities[7]. This technology is not limited to
102 conserving environment but also enhances the profitability of the farmer as Owais et al. (2018), stated that
103 green technology is an alternative of conventional technology which assures minimization of environmental
104 damage leading to increase in farm profitability and protecting natural resources[4]. The researcher agrees
105 with this assertion as the conventional technologies are capital intensive which reduces the profitability of
106 farmers or capable of putting them off the farming business as result of lack finance to access them and
107 equally damage the environment. Asian and Pacific Centre for Agricultural Engineering and Machinery
108 (APCAEM) also defined green technology as “environmental healing technology that reduces
109 environmental damage created by the products and technologies for peoples ‘conveniences[8]. It also agrees
110 with the assertion of Owais et al (2018) that it increases farm profitability while reducing environmental
111 damage and conserves natural resources[4]. Therefore, the basic goal of green technology is to protect
112 environment and repair the past damage and conserve natural resources while carrying out economic
113 activities such as farming in the environment. These definitions serve as a baseline for green technology
114 around the world as well as Nigeria in this review.

115

116 **2.2 Green Technology for Environmental Sustainability**

117 On the ground of trying to increase productivity to meet up with the food demands of the growing
118 population has yielded many challenges such as climate change, environmental pollution, depletion of
119 natural resources, etc. [9]. The researcher agrees with the assertion because before industrialization there
120 was nothing like climate change, environmental degradation or soothe as the difficulties experienced today
121 in some areas in Nigeria.

122 According to Nithya (2017), environmental sustainability “ is the rate of renewable resources harvest,
123 pollution creation, and non-renewable resources depletion that can be continued indefinitely” which implies
124 that environmental sustainability is concerned about the future generation as it is also concerned about
125 present generation, but, it has not being achieved as reported by Minjian et al. (2017) that the environmental
126 pollution, natural resources depletion, climate change, inefficient use of natural resources are among the

growing global problems[9,10]. All these might have resulted from the application eco-unfriendly methods or technology and there's need for advancement into eco-friendly technology that will ensure sustainability of the natural resources and healthy environment for the end-users of the products. Technologies that meet present need without compromising the ability of the future generations to meeting their own need- green technology.

Green technology as environment-friendly technology is not only concerned about preserving the natural environment but also enhances the profitability of the farmer, is a way of ensuring environmental sustainability. It is also in line with the findings of Noor, Ivy, Ali & Rudy (2017), that green technology is much concerned about the future generation and the environmental quality of the end-users of their products[11]. According to Owais, et al. (2018) green technology is environmental sustainability because it provides high quality organic food from high quality environment and retains its natural landscape, habitat and species, ensuring quality life for the people therein[4]. This is so true because literature have proven that consumers are yearning for products that is produced using environmental friendly technology in a quality environment such as products of organic agriculture which is example of green practices. Therefore, green technology practices will lead to actualization of environmental sustainability and provision of high qualitative environment for humanity.

2.3 Green Technologies Used by Farmers in Nigeria

There is practically no challenge in developing agriculture for increasing productivity and income of the farmers without damaging or affecting the environment. This is sustainable agriculture; sustainability is necessary because all over the world including Nigeria where land has been unsatisfied and challenges such as unplanned exploration of the natural resources (land, water etc.) have been realized[8].The sharp increase in the cost of machineries, energy and agricultural inputs have reduced the profit of farmers which has severely damaged the environment [8].

Green technology used by farmers is not totally new in Nigeria. It has potential of achieving increase in farm yield and profit of the farmers by utilizing techniques that are environmentally sustainable , ecologically sound and economically reliable and thus identified the following as the leading green technologies use by farmers- green technology of solar energy, green technology of mixed farming, biogas and organic fertilizers, bio refineries, biofuel, multiple cropping and crop rotation, integrated pest management [4],while Apacem (nd) also identified solar photovoltaic, wind energy, biofuel, biogas, micro and macro hybrid power, biomas, organic farming, integrated pest management, agroforestry as the green technology used by farmers in their agricultural practices and Joseph(2014) also identified IPM and conservation tillage as green technology[8,12].

2.3.1 Agroforestry

Agroforestry is a collective name for land use and technologies where trees are deliberately used in the same land with crops and /or animals. According Food and Agriculture Organization, the trees and the crops usually have ecological and economic interactions and it is dynamic ecological based, natural resources management system that through the integration of trees on farm and in the agricultural landscape diversifies and sustains production of increased social economic and environmental benefits for land uses at all levels. It further stated that agroforestry is crucial to all farmers as it improves their food supply, income and health. This technology is quite green as it ensures the use of natural resources which sustains environment of the farmers and ensures healthy environment. Ibeawuchi et al. (2015) also affirmed the above positions as they noted that agroforestry are used to exploit the benefits of combining trees and crops or livestock and it was

169 introduced to Nigeria in the year 1926 by International Council for Research in Agroforestry [3]. This is
170 really beneficial to the farmers as the produce of land will increase by the products of trees such as timber,
171 fuel wood, rubber and Ibeawuchi et al. (2015) repeated the following practical application of
172 agroforestry[3].

173 a) Wind break trees: These trees are planted by farmers to protect his family and their lands from strong
174 wind, e.g. *Leucaena* spp., *Casuarina* spp., Green giant, Gaint arbrovitac.

175 b) Hedgerow barriers: These are trees planted around sloping lands to control erosion and provide organic
176 matter through their leave fall, example; *Ptercarpus* spp. (Oha). The leaves of the trees are also used as
177 vegetable while the trunk as timber.

178 c) Live fences to control movement of animals in the farm: These are trees planted around the farm stead
179 to secure and limit the movement of animals.

180 The leaves are also used as fodder to feed the animals and their faeces as nutrient for the trees.

181

182 2.3.2 IPM (Integrated Pest Management)

183 This is a knowledge intensive approach which is an alternative to conventional use of chemical to control
184 pest. IPM is basically all about the growth of healthy crops with very little or zero disruption of
185 agro-ecosystem and encourages natural pest control mechanism. According to university of California
186 Agriculture and Natural resources, IPM is a process which you can use to solve pest problems while
187 minimizing risks to people and the environment and it can be used to manage any pest both in urban and
188 rural areas.

189 This can be simply done by taking actions that will prevent pest becoming a problem to you and your farm
190 such as growing healthy crops, planting diseases resistant crops, designing human look alike to scare the
191 pest and rodent away from farm rather than eliminating them with chemicals which also damage the
192 environment. According to Gogi, Nawaz, Sufyan, Sarfraz, & Liburd,(2017), IPM applications rely on
193 knowledge of the pest biology and pest ecology in agro ecosystem and with the knowledge you can be able
194 to identify pest control measures that will be adopted to stop pest without affecting the environment
195 negatively[13]. Gogi et al. (2017) reported the basic principles of IPM as follow:

196 a) Pest avoidance/ exclusion mechanism- This is an action taken early enough to avoid the entry of any
197 pest into the agro ecosystem to ensure its pest free. This is mainly by employing techniques which exclude
198 and prevent the pest such hand-picking, physical beating, noise creation, burning etc. Burning included here
199 as techniques for eco-friendly managing pest also has negative impact on the environment and man.
200 According to Otitoju, Yakubu, Otitoju and Uka(2019), bush burning has negative effect to the environment
201 and health of human as it pollutes the air with production of air pollution such as carbon monoxide,
202 hydrocarbon, hydrogen sulphide, nitrogen oxide, sulphur, etc., this shouldn't be addressed as eco-friendly
203 technique because it also damages natural environment and affects man negatively[14].

204 b) Identification of pest and its status: This is management of pest by identifying the pest; its life stages
205 and effect. Identification of pest will help you determine their status, population and effective measures to
206 employ. However, proper identification of pest especially at early stage is expertise that cannot easily be
207 learned and most farmers don't have this neither do they have financial strength to employ the services of
208 the qualified entomologist.

209 c) Understanding biology and ecology of pest: Sufficient understanding of the biology and ecology of
210 pest such as anatomy, morphology, growth, etc., will enable you choose appropriate method or repellants for

211 the pest than applying whatever that is called pest repellent or adopting any IPM method. This is also quite
212 difficult as an average farmer cannot afford to hire a professional who can do that.

213 2.3.4 Solar Energy

214 Solar energy is a radiant light and heat from the sun that can be harnessed using solar heating, photovoltaic.
215 According to Apacem(nd),solar photovoltaic technology converts sunlight into energy using semiconductor
216 which can be used in agricultural production for pumping water, lighting in rural houses and pest
217 management[8]. For instance solar water pumping prevents lot of problems when compared to conventional
218 fuel such as no cost for fuel, maintenance and doesn't pollute the environment [15]. Sun delivers yearly over
219 10,000 times energy human presently use [4]. In Nigeria, there is enough sun which means that solar water
220 pumping system and other solar related technology will get plentiful amount of solar radiation. Owais et al.
221 (2018) also stated that this green technology as the best alternative for improving the standard of life of rural
222 farmers in terms of cooking and lightning.

223 2.3.5 Biogas

224 This is the transformation of agricultural wastage into fuel and fertilizer through anaerobic digestion.
225 According Apacem(nd), this technology is green because it utilizes agricultural waste and turn into fuel and
226 fertilizers[8]. Biogas is renewable energy source which is utilized in cooking, lightning and can also be used
227 in maintaining temperature inside green house for appropriate plant growth while the by-product are used
228 for organic crop production[4, 16].

229 The residue also increases soil fertility since it has nutrient and has good penetration capacity to the soil. It is
230 a good replacement to inorganic fertilizer and good for crop production since its odour is less by 80 from the
231 feedstock[4,17].

232 2.3.6 Mixed Farming

233 Mixed farming is a common practice on agriculture. The best part of mixed farming occurs where the
234 residual of crops is used to nourish animal while their faeces are used as fertilizers to grow crops and
235 nourish the soil. According to Deshmukh (2014), mixed farming help farmers to overlook the threat of
236 single crop production and it are the top technology for improving eco-friendly food production. This is
237 green technology as the use of the animal faeces as fertilizer in place of inorganic fertilizers[17].

238 2.3.7 Organic Farming

239 Organic farming is one of the most growing current agricultural practices because of its benefits to man and
240 his health and the entire environment. It is the standard of production that doesn't require use of synthetic
241 agricultural inputs but using natural eco-friendly methods to increase soil fertility and discourage pest
242 infestation [3]. It is established that use of synthetic inputs such as fertilizers, pesticides causes damage to
243 the ecosystem and renders its agricultural produce unhealthy for consumption and difficult to preserve.
244 Owais et al. (2018) noted that demand of farm produce of organic farming has rapidly increased as the
245 consumers' desire for quality and safety[4].

246 Organic food is safer and of better quality for consumption and even storage as Owais et al. (2018) also
247 noted that its animal or plant produce based on farming system that avoids the use of chemical fertilizers,
248 pesticide, growth regulators etc.[4]. This is the kind of agricultural produce consumers desires and above all
249 it promotes availability of healthy environment and protects biodiversity which is necessary for efficient and
250 sustainable manipulation of natural environment and resources. According to Oyedele, Wole-Alo,Owolabi
251 & Okunlola (2018) organic farming promotes biodiversity and enhances ecological harmony[18].

252 Therefore, organic farming is a green technology as it avoids the use of off- farm inputs which damages
253 environment and affects man negatively and rely on the ecological based process to increase fertility of soil
254 and enhances productivity.

255 **2.4 The Role of Green Technologies for Environmental Sustainability**

256 Technology is a solution facilitator but it is also part of the problem of environmental damage. Amongst the
257 impact of this conventional technologies on the environment included the misuse and damage of our natural
258 earth and the main two ways this damage have occurred, are through air and water pollution and depletion of
259 natural resources. Henri-Ukoha (2020) noted that Global warming which causes environmental
260 unsustainability is as a result of climatic change which emanated from the activities of man such as fossil
261 fuel burning, deforestation, industrialization which affects the livelihood of the people and eco-system
262 deeply[19]. All these is as a result of the use of conventional technologies and synthetic products in our
263 environment especially agriculture that is practiced by about 80.0 percent of the entire populace of Nigeria.

264 Green technologies have been found to play vital role in solving or reducing to a barest minimum of those
265 negative impact such as;

266 1. Environmental degradation

267 Environmental degradation is the deterioration of the environment through resource depletion including both
268 biotic and abiotic elements that make up our surroundings such as air, water, soil, plant, animals etc., of the
269 planet earth[20]. Over the years, the intensive use of technologies and off-farm input to advance agricultural
270 production has been employed which leads to environmental degradation. Ibeawuchi et al. (2015) stated that
271 environmental degradation is as a result of more use of conventional farming practices than green practices
272 and also identified that the practice lead to environmental degradation such as “erosion of biodiversity,
273 climatic change to pollution, desertification”[3]. Henri-ukoha (2020) also noted that intensive agriculture
274 contributes to over 20% of green gas emission[19]. All these problems are as a result of human activities by
275 application of conventional farming knowledge and technology to the environment. This is in line with
276 Henri-ukoha (2020) who claimed that climatic change is as a result of human activities and it affects
277 agriculture more than any other sector[19]. Whatever that affects agriculture in Nigeria affects the greater
278 percentage of the country entire populace. This implies that the best way to mitigate these impacts is to go
279 green in agriculture production.

280 James,Utpal, and Joseph (2014) noted that farmers using green technology will reduce soil erosion, improve
281 water quality, enhance forest land, grazing land and restores wildlife habitation. This is to say that green
282 technology practices reduce and solves the problem of environmental degradation[12].

283 2. Protection of biodiversity:

284 Biodiversity is the general term of the level of variation in all living things that exist in the natural
285 environment. According to Rawat and Agarwal (2015), biodiversity “is the variety of different forms of life
286 on earth, including the different plants, animals, microorganism, the gene they contain and the ecosystem
287 they form”[21]. Most of the species of both plant and animals which is beneficial to man and ecosystem
288 have been destroyed by the intensive use of conventional practices which makes them unavailable. Rawat et
289 al. (2015), also noted that biodiversity can be conserved by through gene banks, zoos, and botanical
290 gardens[21]. The conservation of biodiversity through that means are feasible but, it is not sufficient and
291 their maintenances cost is high which have rendered many conservational centers in Nigeria inoperative and
292 it is also to note that this conversation centers are also situated around the same bad environment and they
293 are not immune to air and water pollution. Therefore, these methods are not reliable and dependable to

294 achieve healthy environment we all desire, but green technology which involves the use of natural
 295 environment and avoid use of conventional technology and synthetic input use that facilitates the destruction
 296 of biodiversity.

297 3. Self-reliance and natural conservation;

298 The goal of green technology is to sustainably manipulate the natural environment to contribute to
 299 agricultural production positively. The farmer using green technology need different species and plant and
 300 essential ecosystem as a source of input to replace its non-use of synthetic input (Ibeawuchi et al 2015),
 301 which will enable achievement of self-reliance and good environment[3]. Henri-ukoha, Osuji, Effiong, Eze
 302 and Anyanwu, (2019), noted degraded ecosystem as one of the factors that that hinders agricultural
 303 development which means that the use of conventional technologies and farming practice is a contributing
 304 factor to Nigeria food insecurity as it degrades natural environment [22]. Any forms of agriculture in the
 305 natural environment is the obstruction of the natural process occurring in the natural environment by man
 306 which will definitely lead to environmental damage but environmental friendly technologies have seen to
 307 operate with barest minimum damage[3,23,24].

308 Mader (2004), compared organic farming system which is one of the green technologies use by farmers and
 309 conventional farming with respect to their environmental performance and concluded that green technology
 310 (organic farming) showed better confidence interval for environmental performance than conventional
 311 farming and Ibeawuchi et al. (2015); Pretty (1995) also stated that it contributes to rational use of natural
 312 resources and environmental protection which it implies it enhances and preserves natural
 313 environment[25,3,26].

314 **Table 1. Differences between Green Technologies and Conventional Technology**

	Green technology	Conventional technology
	is concerned with the environment.	is not concerned about the environment.
	is concerned about the future generation as meets the need of the present.	concerned about the present alone.
	depends on farm inputs alone.	depends on off-farm inputs.
	increases profit of farmers as the cost is low	increases profit of the farmers as its cost intensive.
	is environmental friendly.	impacts the environment negatively.
	protects and preserves biodiversity.	destroys biodiversity.
	it ensures clean environment and its sustainability.	pollutes the environment and threatens its sustainability.

315

316 **2.6 Challenges to Use of Green Technologies by Farmers**

317 Green technology is not relatively new in Nigeria as our forefathers practiced it long ago but in rudimentary
 318 form before the advent of various off-farm inputs. They used many methods such bush fallow, shifting

319 cultivation, etc., and they were all green as they tend to enrich soil through those means so as to increase
320 their production but the recent some of green technologies are not fully utilized as results of numerous
321 constraints such as:

322 a) Inadequate information on the potentials and limitation of its application: Most farmers don't have
323 adequate information in all the potentials and limitation of green technology because of its newness in the
324 country. According to APECEM, green technology such as photovoltaic which converts solar energy to
325 electrical energy and its used for water pumping, rural area electrification , lightening have proven to be
326 effective but the major setback is inadequate information on the potentials and limitations of its
327 application[8]. This unavailability of detailed information may hinder farmers or government commitment
328 in it.

329 b) Illiteracy of the farmers: The frequent use of chemicals and other off farm inputs in agricultural
330 production has caused a lot of damage to the environment and health of man. APECEM stated that the use of
331 the chemicals has lead development of high resistance pests, affected soil fertility and caused high pesticide
332 residue in food and IPM can mitigate or solve these problems but the challenge is the illiteracy of a farmer
333 as it requires high level of knowledge[8]. IPM is knowledge-intensive approach which most farmers are not
334 learned as such.

335 c) Air pollution: Organic farming is one of the green technologies which avoid the use of herbicide,
336 inorganic fertilizer, pesticide which is detrimental to our environment and man but there is always
337 environmental cost of transporting organic manure to the farm. The cost is polluting the limits the quality of
338 air in the entire environment.

339 d) Lack of technical know-how: Most green technologies application or practice requires technology
340 expert for its efficient and optimize use but most farmers are illiterate and not technocrats.

341 e) Cost intensive:Some of the Green Technologies is more expensive than the technology it intends to
342 replace. Owais et al. (2018) highlighted that green technology application is sometimes expensive but, its
343 cost of training and development can make it even more costly in comparison with established
344 technologies[4].

346 3.0 Conclusion and Recommendation

347 Reviews show that conventional farming method and use of off-farm inputs have been used to advance
348 agricultural production at the expense of natural environment and health of human. The desire of people for
349 quality food from quality environment favors green technology which preserve natural environment,
350 biodiversity and maintain sustainable food and health of man which when used by farmer it ensures
351 environmental sustainability and also increases profit of farmers. Green technology is a path of sustainability
352 as it is conscious of the future while taking care of the present need of man and it guarantees healthy
353 environment. Therefore these recommendations were made; Deployment of well-trained extension agent to
354 sensitize rural farmers on the adverse effect of the use of off-farm input on the natural environment and
355 health of man and the need to go green in their production; elimination of every form of subsidies in the
356 supply of chemical inputs such as inorganic fertilizers, herbicide, and pesticide to discourage the use of such
357 in our farming practices and government to establish adult education centers in the rural areas to increase the
358 literacy level of core farmers so as to facilitate the adoption of green technologies in their farming practices.

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