

# AGRICULTURAL SOCIO-ECONOMIC WINDOW IN ONE PROJECT PALM FRONDS RECYCLING IN JORDAN

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## ABSTRACT

*This research paper contends that date palm fronds are practical for recycling in Bitmus creation (organic horticultural soil) and have a decent potential as an organic fertilizer. Innovative tasks ask makers to reevaluate the utilization of these losses of crude materials, and attempt to safeguard them for organic, rural soil and organic fertilizers' fluid to be utilized for different plants and trees. This could help in safeguarding the climate and lessening the utilization of characteristic assets. The undertaking means to profit by the losses of palm trees in Al Ghor, Jordan, basically date palm fronds which are bountiful (They are by and by singed, causing contamination and damage for ranchers just as the dirt, the climate and the neighborhood network). Such fronds are changed into helpful scrounge for supplement creatures, domesticated animals, and soil fertilizers. The items from this venture will be of a high incentive for ranchers and can be accessible as an option for imported fertilizers at ideal expenses. Likewise the produce will contribute in beating the deficiency of scavenge materials in Jordan.*

**Keywords:** Entrepreneurship, Sustainability, Recycling; Palm Fronds (Phoenix Dactylifera), Bitmus, Organic Fertilizer, Jordan.

## INTRODUCTION

Jordan is a little agricultural nation in the Center East with a restricted common assets, with the populace size assessed to (10,093,380) million and (18.6%) joblessness rate for Jordanian's (DOS, 2018). Jordan is taking a stab at its social and monetary endurance because of its area in a flimsy locale, with an absolute zone of (89,342) sq. km (of which 99% is land and 1% is water) (Al-Yaseen & Al-Jaghoub, 2012). The Jordan Valley called (Ghor Al-Urdon or Al-Ghawr) structures the west piece of Jordan and it applies to the lower course of the Jordan Waterway.

Ghor Al-Urdon is a long and exceptionally limited; it is 105 km long and when arrive at Dead Ocean becomes 20 km wide; it is the most profound and least valley on the planet (- 212 to - 400 m) beneath ocean level; Ghor Al-Urdon is a few degrees hotter than other contiguous zones, rich soils and water made it strong for palm tree (in 2018 it arrived at 600,000 trees) (DOS, 2018). Palm trees should be cleaned twice annually by eliminating dry fronds, ranchers need to measure and eliminate dry fronds all through consuming it. This cycle of burying dry fronds influence intensely the climate in Jordan and Ghor Al-Urdon specifically. This examination endeavors to investigate the way toward staying away from this path in dry fronds removal through recycling and waste administration to limit the waste and improve the atmosphere and climate.

The reason for of Recycling and waste administration are to limit and reuse the waste, recuperate energy lastly arrange the waste. For instance, these standards apply to horticultural mechanical squanders, for example, date palm fronds and palm oil buildups as they never really squander. Likewise, the use of environmentally friendly power assets is deliberately feasible as it can add to the sustainability of energy supply while limiting the negative effects of energy age on the climate. The productive utilization of oil palm biomass other than the palm oil itself for food utilization is a promising strategy to get more energy from oil palm ranches (Abdullah & Sulaiman, 2013). For granulated date palm trees a lot of uses, it was affirmed that they can give extra advantages of diminishing water dissipation from the dirt surface, helping control weed intrusion, dust concealment, forestalling soil disintegration misfortune by wind or water, giving warm adjustment by keeping soil cooler in sweltering climate and hotter in cool climate (Agegnehu, 2017). In any case, with the end goal of effective recycling we propose these two ventures as attainable for recycling in Bitmus creation (organic farming soil) and a decent potential as organic fertilizer.

This examination paper is organized as follows: it begins by a presentation about Jordan and principally Ghor Al-Urdon, and the motivation behind this exploration (ecological issue) when dry fronds removal, additionally it incorporates the primary cycles which are recycling, squander the board, reused items extricated from palm fronds in Jordan. The subsequent segment is important writing about palm trees, fronds, fertilizers. The third segment is an endeavor to build up a hypothetical system to be followed while applying the cycle of dry fronds removal. At that point the two proposed projects from dry fronds removal were investigated. The principle challenges confronting comparable endeavors later on were featured. We finish up by determining our commitments to the exploration and practice of entrepreneurship in the business of recycling, winding up with the outline and proposals.

## **Palm Trees in Jordan**

Sulaiman et al., 2015, in their achievability investigation of gasification of oil palm fronds, discovered that oil-palm fronds are attainable for gasification and have a decent potential as an environmentally friendly power source. (El-deeb, 2017) endeavored in her investigation to discover strategies to connect these materials with Egyptian crafted works utilizing new medicines in assembling with the support to support thinking to deliver packed boards, backdrops, and different articles utilized in inside plan. She attested that 90% of palm fronds are scorched each year in Egypt. This causes natural contamination and is a misuse of maintainable development materials that incorporate exceptionally recyclable substance, quickly inexhaustible and biodegradable items, and nearby assets. A comparative report showed that oil-palm fronds are practical for gasification and have a decent potential as an environmentally friendly power source (Sulaiman et al., 2015).

Sadik et al., 2012, attempted to create top-notch organic fertilizer at a huge scope utilizing plentiful energy assets (Date palm trees mulch delivered from pounded leaves, trunks, and roots) from nearby homesteads. Date Palm Trees Mulch (DPM) was blended in with new barnyard excrement (FYM) as nitrogen source. The outcomes affirmed that total date palms trees could be reused naturally into organic item that has the rules of organic fertilizers, soil stabilizers, and soil manor. Additionally it was affirmed that the use of a combination of excrement and bio-solids is viewed as the best practice that is regularly utilized by ranchers

(Rigane & Medhioub, 2011). Contrasted with singular fertilizers, (for example, nitrogen, phosphorus, and potassium), creature excrements contribute essentially to soil preparation. Additionally, supported utilization of excrements can improve organic substance and the structure of soils (Benabderrahim et al., 2018).

Nordin et al., 2017, demonstrated that regardless of being a biomass squander, oil-palm fronds could be utilized as a beginning material for the creation of bio-composites for superior applications. The replacement of normal filaments to oil-based materials would decrease the reliance on imported oil, consequently adding to cost-viability. At a similar bearing, another investigation was directed for date palm fronds indicated that sheets made of date-palm pruning buildup strands have preferred properties over the MDF (Medium Thickness Fiberboard) property prerequisites which was suggested by ASTM and EN guidelines especially reviewing mechanical properties. What's more, the formaldehyde (HCHO) discharge of the boards indicated that practically all the sheets met the base necessity as per EN 120 particularly for the board fortified with MUF tar. In this manner, Date palm could be an elective material for the assembling of MDF (Rosma, 2011).

This examination is viewed as one of the uncommon investigations in the Middle Easterner world, particularly that the vast majority of the unfamiliar examinations are worried about the recycling of palm oil, which is bountiful in Asia and Africa with little accentuation on date palm fronds. Thinking about the huge and predictable stockpile, date palm fronds could be a promising wellspring of organic fertilizer and Bitmus creation (Organic Horticultural Soil). In the current venture, specialized plausibility of date palm fronds is concentrated tentatively by means of standard tests in the Jordanian (Public Place for Rural Exploration and Augmentation, Directorate of Labs and Quality Control) for the proposed organic fertilizer fluid, and furthermore in the (Feed Investigation Research facility) to decide the fundamental attributes of an example of a date-palm feed. The comprehensive examination is directed to decide the investigated results and contrast them and some connected examinations. With the present worldwide worries of the heightening costs and draining sources, we trust this investigation will likewise include an incentive to existing mindfulness entrepreneurship in Jordan. Climate amicable materials should be deliberately chosen and applied on the proposed plan to "fulfill the current requirements without trading off the capacity of people in the future to address their issues" (Harun, 2018).

### **Dry Material**

	% Crude protein	% crude fat	% crude fiber	% ash	soluble carbohydrates	% total food material	digestibility of dry material	digestibility
Green frond leaves	55.42	8.12	5.43	25.63	9.53	51.31	57.31	43.5
The leaves are dry	90.89	4.86	2.22	34.97	7.65	50.30	52.11	40.01
Cubes hay	89.43	3.56	3.50	41.68	7.83	43.43	51.88	28.7
lentil straw	95.75	5.86	0.74	31.66	8.8	52.94	50.45	
Barley straw	91.99	8.90	1.33	37.13	10.54	42.10	49.63	

Source: Bahman (1986), Atef Mohamed Ibrahim & d. Muhammad Nadif Hajjaj Khalif (2010). The use of date palm fractions in the production of fodder.

A sample of date palm straw hay was examined at the National Center for Agricultural Research and Extension - Laboratory and Quality Control Directorate (Fodder Analysis Laboratory) at the Royal Scientific Society - Jordan on 5/12/2012 and the results of the examination came as follows:

### **Dry Material**

	% Crude protein	% crude fat	% crude fiber	% ash
The leaves are dry	92.1	7.25	2.78	34.29
	11.04	53	55.03	40

Source: Royal Scientific Society - Jordan (2016).

When making a comparison between examining the dry or green palm frond straw sample with the rest of the straws (clover cubes, lentils, barley), it becomes clear that the preference in protein, fat, ash, soluble carbohydrates and the digested nutrient was for green fronds, then barley straw and dry frond straw.

Also, the cost of producing one ton of frond straw, both green and dry, is 28-33% less than the rest of the straw.

These activities try to assemble nearby ability to recognize and actualize earth vigorous advancements for squander date palm fronds recycling and to evaluate their potential for creating new agrarian items, subsequently decreasing ranchers' creation costs. It likewise, surveys the attainability of these advancements regarding nearby financial and ecological qualities and exhibits the advantages of chose through enterprising ventures.

## **RESEARCH METHODOLOGY**

For quite a long time, date palm fronds are pruned consistently however have little use and are for the most part left on the ground in a gigantic amount between palm trees to normally break down for soil protection, disintegration control and supplement recycling. Ranchers are needed to arrange them appropriately to keep away from assembly issues inside manors (Sulaiman et al., 2015). Then again, unnecessary use of synthetic fertilizers causes the decay of subjective soil and agrarian creation (Diacono & Montemurro, 2010; Singh et al. 2007).

Examination and studies affirmed that the use of organic fertilizers is expanding all over world (Agrawal, 2012), and just organic cultivating can reestablish the normal ripeness of the harmed soil by expanding its dirt organic substance which will improve crops efficiency to take care of the developing populace. The equivalent applies to the date palms which develop normally between 15 to 40 degrees north scope in the Sahara, and in the southern outskirts of the Close to East. The date palm is found all through the Center East, and in the northern, eastern, and southern territories of Africa.

## **Proposed Framework of Palm Trees Recycling**

As referenced previously, palm trees should be cleaned double a year from dry fronds. The means of recycling are as per the following: Stage one; fronds are gathered from the homesteads and spread it to get dry; fronds must be over 70% dry; dry fronds are gathered again to be crushed into more modest pieces called dry feed (3 cm to 7 cm length) as required utilizing an adjusted extraordinary machines called (Garouche) for this reason; it is perceptible that for every (1000 kg) granulated we get (800 kg) dry roughage and around (180 kgs to 200 kgs) dry fronds dust, Stage two: what left from pounded dry fronds (dry fronds dust) is then immerse into a huge openings for a while (3 to a half year) in light of the temperature which is between 20 to 45 degree; through this timeframe the substance is flipped constantly; from that point forward, we separate the substance into two sections (dry fronds residue and fluid part); the initial segment which is dry fronds dust then pounded again easily and it becomes (Bitmus); the subsequent part (fluid) is prepared utilizing uncommon sort of Microscopic organisms and Parasite.

## **Palm Trees: The Two Jordanian Entrepreneurship Projects**

We accept that there is an intriguing undertaking with regards to recycling through delivering two kinds of farming activities from date palm fronds: Bitmus (Organic Horticultural Soil) and organic fertilizer which could help in saving the climate and diminishing the utilization of common assets. In Jordan, numerous troubles are identified with treatment by dairy animals' compost, for example, taking care of, transportation and huge sums needed to get the supplement needs of plants. Along these lines, the ranchers and scientists are ceaselessly searching for an elective organic fertilizer from their normal environment. Regardless, there are uncommon investigations directed right now on managing the effects of these ventures. Thus, this examination is led contemplating that the Jordanian economy is confronting numerous issues; two of the most imperious is the reliably high joblessness rates and absence of common assets which these undertakings can contribute in taking care of these issues. The presentation of the activities guarantees the financial adequacy of the nation and act like a defensive shield to monetary stuns, particularly in the agricultural nations where such sorts of examination are restricted.

### **Bitmus Project: Organic Agricultural Soil**

Bitmus or organic horticultural soil made generally out of plant material; here in this venture, Bitmus is formed from dry fronds dust, Bitmus is basic for plant development. Transformation of plant squander into organic farming soil, which can be helpful for horticulture of different types as an option in contrast to imported Bitmus. The task is remarkable and inventive, expecting to be the first of its sort in the Arab world.

### **Mechanism of the Project Implementation:**

- 1) Assortment of plant squander that is a weight on the climate where it turns into a sickening wellbeing.
- 2) Pound those squanders and slice them into little pieces to accelerate the organic change measure.
- 3) Gathering the processed waste in water lakes and adding microorganisms (microscopic organisms and Growths) to quicken the cycle of deterioration of the first materials for 3-6 months as per the temperature.
- 4) Drying the resulting solids, at that point relaxing them and gathering them in sacks or holders.

### Organic Fertilizer Project

Organic Fertilizer is a plant fertilizer that is gotten from dry fronds dust. Take concentrates of the Bitmus plunged from the openings and gather them into a holder for change, so it produces organic fertilizer, fluid and regular supplement that can be utilized for a wide range of plants and trees.

System of the venture usage:

- 1) Separating Bitmus through dewatering by siphons.
- 2) Gathering fluid separated in exceptional holders.
- 3) Adding helpful microorganisms to make the substance changes expected to deliver the principle supplements of plants normally away from synthetic substances.
- 4) Taking care of microorganisms with normal supplements to quicken disintegration.
- 5) Sifting the concentrate and pack the items into uncommon holders to be prepared for usage.

### BITMUS AND ORGANIC FERTILIZER: RESULTS AND TESTS

A sample of Bitmus was sent to the lab (National Center for Agricultural Research and Extension, Directorate of Laboratories and Quality Control, Feed Analysis Laboratory, Jordan) for test the contents, results of the test showed that the sample includes multiple material such as: protein (7.25%); fiber (34.29%); moisture (11.04%); ash (14.03%), NDF (60.23%); ADF (40.23%); fat (2.78%); and carbohydrate (51%). The second test was for the organic fertilizer liquid, and the result of the test is presented in Table 1.

<b>Table 1</b>				
<b>Organic Fertilizer Liquid tests</b>				
<b>Sample of organic fertilizer liquid</b>				
<b>Laboratory number: 468/2018</b>			<b>Operation number: F/18/173</b>	
<b>Test No.</b>	<b>Test name</b>	<b>Result</b>	<b>Unit</b>	<b>Test method No.</b>
1	pH	7.3		973.04
2	EC	25.5	dS/m	973.04
3	Organic matter	0.8	wt/v %	
4	Organic Carbon	0.5	wt/v %	
5	Fe	128.5	ppm	AOAC 965.09
6	Mg	2581.5	ppm	AOAC 965.09

7	K	1342.5	ppm	AOAC 983.02
8	Na	0.08	wt/v %	AOAC 983.02
9	Cl	0.02	wt/v %	AOAC 928.02
10	Density	1.0	gm/cm <sup>3</sup>	QC-01-016

Most investigations were led on a similar issue as of late, however our task began before and is viewed as an extraordinary venture since we convert the palm squander into feed for ruminant creatures, for example, bovines, cows, sheep, and camels and so forth, as feed and feed. Most of the past examinations and activities zeroed in on one point either to deliver roughage, or to create fertilizer as it were. In any case, this task manages the two capacities, delivering scavenge and creating Bitmus and simultaneously delivering organic fertilizer. There was no comparable task that produces Bitmus. Indeed, even comparative activities produce manure by basic and customary ways, and creation of Bitmus needs more materials and certain estimates that can't be applied without any problem. In delivering Bitmus, we copy a similar strategy for Bitmus creation in North Europe and North America.

The proposed project produces three items simultaneously from granulating palm waste to creating roughage. The misuse of creating feed has been utilized to deliver Bitmus, and after Bitmus arrangement we have the fluid which results from Bitmus to create organic fertilizer with exclusive requirement quality. Our fertilizer comprises of three segments including natural life forms, organic conceptual and the mineral part. Hence, our venture creates a one-of-a-kind fertilizer that gathers three components in a single item (bio, organic and mineral) simultaneously.

The proposed fertilizer goes about as three of every one (organic, natural, and mineral fertilizer), since this item is special for its uniqueness and energizer greenery up reviewing state of manure that is rich with organic issue, organic fertilizer and simple to use for seed ranch however fertilizer that doesn't go about as Bitmus.

Besides, the fluid organic fertilizer is immersed with useful bacterial (bacillus type) that assists with enhancing the plant root climate with dissolvable fertilizer and update the fertilizer ingestion by plants which is considered plant creation and its size. This preferred position isn't found in other organic fertilizers, as our fertilizer goes about as nourishment for plants and conditioner for soil, which diminishes soil saltiness, and its PH. It additionally goes about as a difficult factor for mineral fertilizer, keep it in the root and deliveries it gradually as the as per the plant needs.

### **Social Benefits of the Project:**

The unemployment rate in Jordan in 2020 was approximately 23.9%, according to general statistics. (Department of Statistics, 2020), the social returns of the project are: The social returns of the project are represented in that it provides more than 75 job opportunities for the category of youth who often work less than 15 hours per week, due to the lack of demand for their employment and due to the small number of projects that work to employ them

permanently, but this project attracts unqualified workers (usually) And operate it in a beneficial way, and some of these young people had previously been involved in bad work and caused harm to their society, so this project absorbed them in a useful way for them and their families.

### **Economic Benefits of the Project:**

Addressing the problem of unemployment in a poor society in addition to providing hard currency for the country instead of importing the three products from outside countries, According to a bulletin issued by the Department of Statistics in Jordan, approximately \$ 320 million goes to cover Jordan's imports of hay and fertilizer, Jordan imports 80% of its annual feed needs estimated at 400,000 tons (Department of Statistics, 2020).

### **Environmental Benefits of the Project:**

Recycling agricultural wastes and converting them into livestock feed, a high-quality agricultural soil and liquid organic fertilizer, while they used to be burned previously and thus pollute the environment and cause harm to the ecosystem, In addition, the effort and cost incurred by the municipality in transportation, labor and disposal of these wastes.

### **Challenges Facing the Projects:**

It is accounted for that in different nations up to 40% of new arising firms fizzle inside the initial 2 years of life (Vivarelli, 2013). There are different factors and difficulties which are related with the low presentation of little firm in the non-industrial nations that face troublesome financial circumstance, absence of suitable government approaches, poor infra-primary offices, higher working costs, defilement (Abdullahi & Sulaiman, 2015; Hafeez et al., 2013), low degree of abilities, deficient enterprising skills, trouble in getting to innovation and low efficiency (Hussain et al., 2015) and generally unseemly and wasteful usage of the firm assets (Rauch & Hatak, 2016; Bloodgood, 2014; Hilkevics & Semakina, 2019). For the instance of enterprising undertakings, the absence of seeing how little and medium firms can create basic abilities and secure their future exhibition is considered among the difficulties that dissuade achievement (Greer et al., 2016). In any case, experiences from the US show a positive marker where about half of all new foundations overcome five years or more and around 33% are yet working and maintaining their business following 10 years (SBA, 2014).

We accept that fruitful business visionaries are frequently portrayed as diligent, enthusiastic, adaptable, and normal daring people. They are visionary scholars, certain, and endure vagueness. Regardless of whether a businessperson has these character characteristics, a fruitful undertaking requires a feasible business idea and a sensible arrangement. In fact, a large portion of the crude material can't be promptly surveyed on the grounds that significant estate organizations are very hesitant to bring biomass materials past their ranch borders. This overall strategic issue of moving the item to the handling focuses is exorbitant and could be much higher than the expense of the crude material itself.



## RECOMMENDATIONS

The Jordanian government ought to apply more exertion to audit and create related approach and software engineers to help the extension of option horticultural assets and feedstock hotspots for feasible improvement of intensity age in the nation.

Further experimentation with other variable components will be led to affirm our discoveries with date palm frond manure and Bitmus to permit correlations with comparable investigations. Date palm waste may make issues of supply on the grounds that, however they are delivered in enormous amounts, they are very scattered and transport costs for this massive crude material may turn out to be pretty much a hindrance, so further examinations are prescribed to make more financial studies. Furthermore, full creation preliminaries should be led to affirm our pilot-scale results. Also, we accept that there is reason for additional examination with respect to innovative ventures from other byproducts in Jordan.

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