

Overview of Selected Native Seeds in Agricultural Wastes and its Properties

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Abstract

Agricultural waste is considered as the valuable asset in the world, they can be actively used as fibers, fertilizer, biogas production, softwood furniture manufacturing etc. However, limitations are to be taken into account. Generally, seeds play a major role in agricultural waste which indicated with huge amount of nutritive value and phytoconstituents. They reflect the therapeutic activity. In this review, we discussed the seeds phytoconstituents and their utility as bioactive agent. In near future, it would be efficient to gain knowledge of seeds which is considered as a waste in their therapeutic evaluation and also as nutritive value.

Keywords: Agrowaste-seeds, seeds, bioactivity, physico-chemical properties, chemical composition.

Introduction

Agricultural wastes are broadly accessible, they are considered as an important source due to their properties like renewable and virtually free². They can be changed over into heat, steam, charcoal, methanol, ethanol, bio diesel and also crude materials (animal feed, composting the soil, energy and biogas development etc.). All these wastes are well-known to have high supplement levels of nitrogen, potassium, phosphorus which would enhance soil fertility and crop yields are increased, for example, vegetables, maize that bring high costs and consequently upgrade food security. This substitute technique for usage by farmers for horticultural generation has additionally lessened the rate of accumulation, with consequent decrease on ecological contamination in this way enhancing natural wellbeing. This requires a more prominent familiarity with the general population and farmers of the advantages of appropriate management and use of natural waste in agriculture. This will prompt reduced fear and assumptions of irritation issues that diminish arrive values and environmental degradation²⁹.

Malaysia is located in Southeast Asia demonstrating a high development rate in the economy. This is credited to the way that Malaysia government approach has prompted the industrialization of the nation driving towards the long-term responsibility for attaining the status as developed country by 2020¹⁰. With the fast-

economic growth, Malaysia's gross domestic product (GDP) has advanced so that a growth rate of 5.1%, 5.6% and 4.7% has been attained in 2011, 2012, and 2013 respectively. In accordance with this, the total population of Malaysia has increased from 18 million in 1990 to 30 million in 2014^{25, 26, 27, 28}. Therefore, the energy demand in Malaysia has extremely risen during the most recent two decades.

Agricultural wastes all around if developing nations keep on intensify cultivating systems. It is evaluated that 998 million tons of agricultural waste is delivered yearly. Organic waste can sum up to 80 percent of the overall solid waste produced in any farm²⁹

In Malaysia, about 1.2 million tons of agricultural wastes are disposed of into the landfills yearly^{3, 4}. It is assessed that 15% of the entire waste produced in Asia is agro-waste, with rural waste production in Malaysia at roughly 0.122 (kg/top/day) in 2009 which is anticipated to achieve 0.210 (kg/top/day) by 2025^{3, 4, 18, 19}

So the objective ought to be to make the farming waste an asset that can be used and not simply disposed of. It is additionally vital to set up establishments that can outfit the extensive capability of rural squanders as an asset in cultivating and in vitality creation. Utilizing proper innovations, animal and product waste can be transformed into valuable assets.

Materials and Method

1-Agricultural waste:

Is defined as the waste outcome from various agricultural processes. It comprises of manure, other wastes from crop residues and harvest waste (like residual stalks, straw, leaves, roots, husks, shells, etc), poultry houses and slaughterhouses, fertilizer run-off and pesticides so on. Agricultural practice involves in all actions that can arise on a farm and incorporates activities, for example, slurry spreading, chemical and waste storage, silage making and waste pesticide clearance.

There are few main types of agricultural waste such as biological, solid and hazardous. Biological waste is any material which contains or has been contaminated by bio hazardous. Biological waste which contains syringes, culture tubes, blood vials, absorbent material etc., whereas solid waste include garbage, rubbish, refuse, litter etc.

Features of agricultural solid waste:

*Fruits and vegetable processing:

Where the type of waste includes biological sludges, trimmings, peels, leaves and stems, soil, seeds and pits, and **the disposal method includes** Landfill, animal feed, land application, burning.

*Sugar processing:-

where the type of waste includes Biological sludges, bagasse, pulp, lime mud, filter mud and **the disposal method includes** Landfill, burning, composting animal feed.

* Animal production:-

where the type of waste includes Blood, bones, feather, litter, manures, liquid effluent **the disposal method includes** Land-application, fertilizer

* Dairy product processing:-

where the type of waste includes Biological sludges **the disposal method includes** Landfill, land spreading

* Leather tanning:-

where the type of waste includes Fleshings, hair, raw and tanned hid trimmings, lime and chrome sludge,

grease **the disposal method includes** Rendering, by-product recovery, landfill, land-spreading

* Rice production:-

where the type of waste includes Bran, straw, hull **the disposal method includes** Feeds, mulch/soil conditioner, packaging material for glass and ceramics

* Coconut production:-

where the type of waste includes Stover, cobs, husk trunk, leaves, coco meal **the disposal method includes** Feeds, vinegar, activated carbon, coir products

Results and discussion

1-RISK OF AGRICULTURAL WASTE

Risk is viewed as a significant and ever-present factor affecting the advancing conduct of farm changing in accordance with disequilibria in agriculture.¹⁷ Manure and straw burning will produce a great deal of harmful gas, smoke, and residue, and air environment^{21, 23}

particulate matter from manure, air ventilation and smoke from incinerators passes into the air and particularly cause respiratory problem in humans¹²

1.3 NUTRITIVE VALUE OF AGRO-WASTES

The nutritional state of the fertilizer may likewise help in concealment of soil-borne plant pathogens.¹⁶ Manure and organic matter contain nutrients that are not promptly accessible for plant up-take, in contrast to inorganic fertilizers.²⁹

1.4 BENEFIT ECONOMY OF AGRICULTURAL WASTE

The advancement of agricultural industry waste biomass through escalated utilization of non-conventional crude materials, for example, oil palm, coconut, pineapple and bagasse were in technically and economically attainable.^{14, 15}

Benefits of agricultural waste in Malaysia are discussed in Table 1.

Table 1: Benefits of agro-wastes in Malaysia

Agro-waste	Benefits
Rice husk	Electricity production
Rice husk ash and charcoal	Additive in cement mixes, water glass manufacture, active carbon
Banana peel	Paper making pulp
Oil palm empty fruit bunch (EFB)	mulching, organic fertilizer, reinforcement in polymer
Oil palm stems and rubber wood	Composites, particle boards, softwood furniture
Onion skin and ground husk	Heavy metal removal, mushroom cultivation
Sugarcane baggase and banana fruit reject	Ethanol, biogas production
Sunflower stalk, corn stalk, baggase fibers	Reinforcement for polymer composites

Source: Adopted from ¹⁵

Some building items, for example, boards, door screens, door frames, material sheets and batter forming mixes produced using jute, sisal, coir were explained. ²⁹. In

China bagasse has been utilized to make particleboard²⁹. Hardboards produced using Thai hardwoods and coconut fiber have been explored in Thailand ²².

Ikpambese et al.²⁰ considered the use of palm fibers for asbestos free car brake cushions.

2-AGROWASTE SEEDS

Agricultural wastes which incorporate by-product of agricultural activities²¹.







		
<p>Figure 1 Durian fruit</p>	<p>Figure 2 Papaya fruit and seeds</p>	<p>Figure 3 Pumpkin</p>
		
<p>Figure 4 Mango</p>	<p>Figure 5 Jackfruit</p>	<p>Figure 6 Rambutan</p>

Table 2 Physicochemical properties of seeds

Species	Physicochemical properties							
	pH	Saponification value	Acid value	Iodine value (g)	Specific gravity	Moisture content (%)	Viscosity (mm ² /s)	Peroxide (meq/kg)
<i>Durio zibethius</i>	4.5	190.65	19.4	81.07	Less than 1	54.90	360 cps	3.9.
<i>Carica Papaya. L</i>	5.93	193.5	0.94	76.9	0.918	5-7	27.4	0.18
<i>Cucurbita</i>	7	185.5-195.3	0.516	121	0.920	30-35	45	8.66
<i>Mangifera indica</i>	4	190.1-195.1	5.8	39.6	2.18	44.4	3.3	1.2
<i>Artocarpus heterphyllus Lam</i>	5.78	353.65	3.51	14.15	0.6-0.7	55	1.52	6.4
<i>Nephelium lappaceum</i>	5	182.1	6.1	50.27	0.71	34.1	1244 cps	4.2

3-BIOACTIVITY

*ANTIOXIDANT (DPPH ASSAY) OF SEEDS OIL

Antioxidant is a process of inhibition of oxidation of other molecules. Oxidation is defined as a chemical reaction which transfers electrons or hydrogen from a substance to an oxidizing agent.²⁹

1-DURIAN

There are a few reports accessible on deciding the antioxidant activity of durian. *In vivo* work directed by Leontowicz et al.²⁴ results indicated that durian have high dimensions of antioxidant agent with polyphenols and flavonoids which contrasted with the develop and overripe durians.²⁴.

2-PAPAYA

Oxidative damage is linked with high events of some degenerative diseases like cancer, arthritis, arteriosclerosis, inflammation, aging and brain dysfunction. Earlier studies demonstrated that papaya fruits, leaves and seeds are high in antioxidant activity with high amount of vitamin B, C and E, carotenoids⁹.

3-PUMPKIN

Pumpkin seed protein was found to lessen the

detrimental effect related with protein malnutrition and CCl₄ intoxication²⁵. Pumpkin was established to effectively hinder the H₂O₂-caused diminished cell viability, lactate dehydrogenase leakage, and malondialdehyde formation.²¹

4-MANGO

The major antioxidant agents, Vitamin E, vitamin C and β -carotene, might be valuable to disorders. The extract was report to possess a scavenging action of hydroxy radicals and iron chelator.²⁹.

5-JACKFRUIT

In jackfruit 12 to 14 mg of vitamin C is available per 100 g, which is well known for antioxidant property. Vitamin E (α -tocopherol) is a basic supplement that capacities as a chain-breaking cell reinforcement and can keep the engendering of free radical responses on all cell films of the human body. The acetone extract of jackfruit was found to have higher radical scavenging activity²⁵.

6-RAMBUTAN

Rambutan peel and its by product possess strong antioxidant activity with respect to particular mechanisms like antiradical, ferric reducing activity, chelating agent, beta-chelating agent and lipid peroxidation method¹².

5-ANTI TRYPANOSOMAL ACTIVITY OF THE PLANT SEEDS OIL

Papaya extract was used as an anti-trypanosomiasis agent. Administration of chloroform extract of papaya seed was reported to inhibit the *Trypanosoma cruzi* in animal ²⁵. Leaf decoctions of papaya was documented to possess activity against *Trypanosoma brucei rhodesiense*, *Trypanosoma cruzi* ^{15,22}. Leaves of papaya was shown to inhibit *Trypanosoma brucei* at different concentrations ¹¹. Ethanolic extract of papaya was found to decrease the number of *Trypanosoma evansi* in liver and kidneys ²⁵.

6-SUN PROTECTION FACTOR (SPF) OF THE PLANT SEEDS OIL

Sun protection factor is defined as the numerical ratio between the minimal erythemal dose (MED) of sunscreen-protected skin which is applied about 2 mg/cm² and the minimal erythemal dose of unprotected skin.

7-CHEMICAL PROFILE IN SEEDS OIL

Chemical constituents in *Durio zibethius*, *Carica Papaya. L*, *Cucurbita*, *Mangifera indica*, *Artocarpus heterophyllus Lam*, *Nephelium lappaceum* are discussed in detail.

8-FATTY ACIDS COMPOSITION OF SEEDS OIL

Durio zibethius was found to possess fatty acids in seed. Palmitoleic acid methyl ester, Palmitic acid methyl ester, Ethyl-9-hexadecenoate, Palmitic acid ethyl ester, 9,12-Octadecenoic acid (Z,Z) methyl ester Linoleic acid methyl ester, 9-Octadecenoic acid (Z) methyl ester(6) Oleic acid methyl ester, 9-Octadecenoic acid (E) methyl ester Oleic acid methyl ester, Octadecanoic acid methyl ester Stearic acid methyl ester, 9,12-Octadecenoic acid ethyl ester, Linoleic acid ethyl ester, Z-Ethyl oleate, E-Ethyl oleate, 5,8,11,14,17-Eicosapentaenoic acid (all-Z) methyl ester, 4,7,10,13,16,19-Docosahexaenoic acid (all-Z) methyl ester, Cholest-5-en-3-ol(3.beta) 24.951 386.36 99 1,2 15 Vitamin E ^{5, 8,20,12,13}.

10- α -TOCOPHEROLS COMPOSITION OF THE PLANT SEEDS OIL

Durio zibethinus was found to possess α -tocopherols about 1.50 \pm 0.26 mg/100 g ²⁵. Researchers found that 51.85 mg/kg of α -tocopherols was present in *arica Papaya. L*²⁶. Additionally, antioxidant property of

Carica Papaya. L was documented due to the presence of α -tocopherols in the peel and seeds¹³.

11-PHENOLS COMPOSITION OF THE PLANT SEEDS OIL

The total phenolic composition of durian fruits along with seed was reported to be 690.62-999.28 mg/L ⁷. The investigation of phenolic composition of different durian cultivars was 361 - 272 mg GAE/100 g FW ¹⁹.

12-FLAVANOLS COMPOSITION OF THE PLANT SEEDS OIL

In durian, flavonoids were found to be present in 97.9 mg CE/100 g⁶. Stereochemistry and hydrolysis pattern of flavan-3-ol, where durian seeds were found to present the specific content of oligomeric proanthocyanidins ^{1,2,18}

R ₁	R ₂	COMPOUND NAME
H	H	Afzelechin
H	OH	Catechin
OH	OH	Gallocatechin
H	H	Epiafzelechin
H	OH	Epicatechin
OH	OH	Epigallocatechin

Conclusion

The agricultural waste through escalated utilization of non-conventional crude materials. Likewise, agro-based waste material has been utilized for numerous applications. Some basic applications utilizing natural fiber composites for automotive and building parts.

Conflict of Interest – Nil

Source of Funding- Self

Ethical Clearance – Not required

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