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WEEDS-VEGETABLES AND FRUITS ACT AS POTENTIAL BIOMEDICINES AGAINST COVID-19: ENRICHED AGRICULTURE BIODIVERSITY SOCIO-ECONOMY SCIENCE TECHNOLOGY COMMUNICATION BY CONTROLLING PLANT DISEASES

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KEYWORDS

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Biomedicines-COVID-19
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Socio-economy
Science-technology
Plant-diseases

ABSTRACT

The past two decades have seen several viral-epidemics, causing great loss of human lives. The recent COVID-19 epidemics emerge as serious-global-threat to human civilization, public health, agriculture, travel, socioeconomic, education and even clinical research also. It has no specific therapeutics, and effective treatment options. Though the middle and upper classes are able to manage, but the low income households are really suffering. So Government of India wants to reorient the COVID-19 crisis by developing policy initiative. So it is focused on the consumption of nutritious as well as traditional medicinal weed vegetables and fruits, for preventive measures against human-diseases which are naturally infected with different pathogens caused diseases and significantly decreasing food production. Though pesticides are the most effective means of control, but they are costly and not environment friendly. So, it is emphasized on the multiple-intercropped weed vegetables fruits plants of the 4 plants species viz., amaranth, cucumber, cowpea, and okra plants, and determines the effects on pathogens infected diseases; Root Knot and Mosaic Virus. After harvesting, of these 4 plant species, amaranth and cucumber received maximum infection, forming the “Eco-Friendly-Highly-Economical-Potential-Biomedicines-Cover-Catch-Weed-Vegetable-Fruits-Crop-Plants”, conserving “Biodiversity-Conservations-Sustainable-Climate-Health-Development-Green-Socio-Economic-Implications-Agriculture”, though all are highly susceptible to pathogens and the farmers would be double benefited; by controlling diseases, and by marketing. In biomedicines, weed-vegetables fruits OR the plant-Mosaic-Virus has been developed as antigenic epitopes derived from the vaccine targets-COVID-19 infectious epidemic disease agents, and the chimeric virus particles, use in vaccine formulations or treatments, as one of the most-powerful

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cost-effective emergency-healthcare-easily-available safe-edible prepare-able easy-applicable future-personalized-potential-biomedicines act as “Preventive-Measures and Safe-Alternative-to-Live-Replicating-COVID-19-Vaccines”, by increasing our natural-immune system, which is one of the milestone events amidst many important changes in the past decade that have necessitated formulation of a new-outlook and strategy for preventing-“Future-Pandemic-Pathogens-of-21st-Century-Advances-Research-Diagnosis-Treatment-Control-Enriching-Food-Security-Biodiversity-Agriculture-Green-Socio-Economy-Medical-Science-and-Technology-Communication-Applications-Innovation-Issues”, based on the theme “Vision 2040” that would help policy-makers.

1 Introduction

The past two decades have seen several viral epidemics, causing great loss of human lives, and the current ‘human-challenge’ pandemic coronavirus disease 2019 (COVID-19), caused by a novel coronavirus “severe acute respiratory syndrome coronavirus -2 (SARS-CoV-2), has shown unique global challenges to human civilization, our private and professional life and the social organization communities, health systems “the invisible patients”, devastating social and economic consequences, truism and education (Guleria & Srivastava, 2020; Cohen, 2020a; Filetti, 2020; Cal et al., 2020; Blumenthal et al., 2020; Madhusoodanan, 2020; Malik et al., 2020; Rodriguez-Morales et al., 2020). Reopening of the educational institutions could also threaten the surrounding community, and employees will not be permitted to teach or work (Madhusoodanan, 2020). So the scientists, have been an urgency to develop vaccines against coronavirus (Brouwer et al., 2020; Yattoo et al., 2020) or to find out the quickest and most efficient effective treatment pathway and prevention strategies, but remain careful regarding scientifically robust and ethically sound clinical research (Dhama et al., 2020a; Rabaan et al., 2020; Science Daily, 2020). The fifth endemic coronavirus, leaps from animals, forming humans health danger in the future due to very closely related animal-human virus, genetic resistance, divergence, structural and the future evolution, adaptation, and spread, prevails a long time as an asymptomatic patients, and the recent, pandemic situation is analogous to war, the delay of every week in the deployment of a vaccine to the seven billion humans on earth will cost thousands

of lives, and WHO develops a blueprint for diagnostics, vaccines, and therapeutics against novel coronavirus (Buschman & Skamene, 2019; Ciotti et al., 2020; Cohen, 2020a; Julka, 2020; Roujian et al., 2020; Science Daily, 2020; WHO, 2020f; Zhang & Holmes, 2020). It has no targeted therapeutics, and effective treatment options, remain very limited. Though the middle and upper classes are able to manage, but the low income households, the marginalized in the cities, and groups like senior citizens, are really suffering (Karamchandani & Rath, 2020). So the Government of India, reorient in the wake of the COVID-19 crisis, a landmark policy-initiative has been flagged (GOI, 2020a; GOI, 2020b).

To overcome the pandemic situation, India emphasis on preventive measures by the cost-effective fresh weeds, vegetables and fruits (**Plate 1**); amaranth, cucumber, cowpea, and okra, qualify as an ideal food source for people of low income-food deficit countries, - “Aid to Eating and Staying Healthy during COVID-19”, to provide food and immunity, the entire plant is used to make medicine, resisting different diseases (Anonymous, 2015; Gemede et al., 2015; Fabbri & Crosby 2016; Kumaraswamy, 2016; Agatemor et al., 2018; Datta, 2020d; Datta, 2020e; Datta, 2020f; Datta, 2020g; Govender, 2020; ISAAA Shares, 2020). But the global food security crisis in COVID-19 is significant problems (CBU, 2020a) and the production of vegetables and fruits; amaranth, cucumber, cowpea, and okra, are hampered adversely by the naturally occurring Root-Knot (RK) diseases caused by the nematode-pathogens, *Meloidogyne incognita* (Kofoid and white, Chitwood, 1949), Amaranth Mosaic Virus (AMV) disease, Cucumber Mosaic

Plate 1 Amaranth, Cucumber, Cowpea and Okra weeds-vegetables and fruits

Virus (CMV) disease, Cowpea Mosaic Virus (CPMV) and Okra Yellow Vein Mosaic Virus (OYVMV) disease, caused by the virus-pathogens (**Plate 2**), which spreads by an insect vector, named-whitefly (*Bemisia tabaci* Gen). The use of chemicals is the most effective means of control, but they are expensive and not environment-friendly creating different health hazards (Datta,1999; Datta, 2005), and climatic changes impact on the global economy also (Valipour,2014; Valipour, 2015).

A number of phytomedicines or biomedicine or bio-agents or bio-nematicides only stand as a suitable and useful against different

plants, animals and human diseases caused by pathogens, and recently also have been identified to possess potential against SARS-CoV-2 / COVID-19 (Datta et al., 1997; Datta et al., 1998; Datta, 1999; Datta et al., 2000; Datta & Datta, 2000; Datta, 2005; Rahal et al., 2014; Dhama et al., 2015; Datta & Datta, 2016; Dhama et al., 2018; Tiwari et al., 2018; Datta, 2020a; Arshad et al., 2020; Devanssh, 2020; Divya et al., 2020; Jahan & Onay, 2020; Mani et al., 2020; Panyod et al., 2020; Staff Reporter, 2020). But it remains some problems in the rapid depletion of natural resources, biodiversity conservation, and not cost-effective (Datta, 1999; Datta, 2020f).

Plate 2 Amaranth, Cucumber, Cowpea and Okra Plants infected with Root-Knot and Mosaic Virus diseases

Then, it is thought that 'Homeopathy' may solve all the above mentioned problems (Datta, 2006; Datta & Datta, 2012; Datta & Datta, 2013; Datta, 2019b). But it has some cost. Only, intercropping would help in identifying the "Susceptible Catch-Vegetable-Fruits-Crop-Plants" for possible control of plant diseases caused by different pathogens and it is primarily observed (Datta et al, 2000; Datta, 2019a; Datta, 2020a; Datta, 2020b; Datta, 2020d; Datta, 2020e; Datta, 2020f; Datta, 2020g).

Now, the main aims and objectives of this article, are to find out the most suitable solution, a trial was planned in order to use of vegetables and fruits; amaranth, cucumber, cowpea, and okra, as a "Susceptible Catch Vegetable Fruit Crop Biomedicine Plants", multiple intercropped of 4-plants species, to determine the effects on pathogens-infected-diseases; Root-Knot (RK) and Mosaic Virus diseases, in a well-protected-garden. And to overcome the present epidemic COVID-19 disease, it is planned to publish as suggestions, for greater prevention against COVID-19, by boosting the human immune system.

2 Materials and Methods

2.1 Location of the field trial

The field experiment was administered at the well-protected garden of Kanchannagar D.N. Das High School (HS), Government of West Bengal, where the temperature was $28 \pm 5^\circ\text{C}$, ratio was $75 \pm 5\%$ and soil pH 5.8, measuring 0.02h land, infested with root-knot disease naturally (Datta et al., 1997; Datta, 2005; Datta, 2019a). Burdwan is extending from $22^\circ 56'$ to $23^\circ 53'$ North latitude and from $86^\circ 48'$ to $88^\circ 25'$ East longitudes. The experimental field has sandy soil, well-drained and slightly acidic in nature and therefore the average rainfall was 150 millimeters. All the information was counted for statistical analysis by the analysis of variance ($P \geq 0.01$).

2.2 Preparation of the Sector Trial

The experiment was conducted by the students of Kanchannagar D.N. Das High School (HS), Purba Bardhaman, Government of West Bengal. Soil was interchanged to stay the nematode population as uniform as possible with mixing manure (2:1 vol/vol). For uniform distribution, within the inoculated plots, soil and root samples were taken randomly to work out the extent and intensity of *M. incognita* -pathogen infestation by mixing @ $2,55,000 \pm 25338$ J2 / plot each (*M. incognita* juveniles), and control plots were treated with predicament 5-times daily @ 15-days with sun-dry (Christie & Perry, 1951; Sukul, 1987; Datta, 1999; Datta et al., 2000; Datta, 2005; Datta & Datta, 2016; Datta et al., 2016). These experimental fields were randomized within the infested field by employing a completely randomized block design. All the info was counted for statistical analysis by analysis of variance ($P \geq 0.01$).

2.3 Plantation

Aseptically germinated seeds of amaranth (*Amaranthus viridis* L. cv.CO-1), cucumber (*Cucumis sativus* L. cv local Slicing variety), cowpea (*Vigna unguiculata* L. cv.5269), and okra (*Abelmoschus esculentus* L. cv. Ankur-40) and were planted alternately with a niche of 25cm within the control and infected inoculated plots. Since amaranth was a slow-growing plant, it had been planted 15 days before the other 3-plants. The plots were: uninoculated control and infected inoculated plots, replicated thrice (Datta et al., 2000; Datta et al., 2016; Datta, 2020d). The naturally infected Root-Knot and Yellow-Vein-Mosaic-Virus-diseases occurred at the 4-leaf stage of plants. All the info was counted for statistical analysis by analysis of variance ($P \geq 0.01$).

2.4 Harvesting

Sixty-five days after plantation of cucumber, cowpea, and okra, all the plants were uprooted and therefore the following parameters of growth and pathogens infection were recorded: average number of leaves /plant, the typical number of Yellow-Mosaic-Virus disease-infected leaves/plant (%), the typical number of root galls/plant, the typical number of nematodes (Root-Knot) per 2g of root and 200 g soil, average biomass (g) of fresh weight of shoot and root, and average folding of root and fruits- protein content. Three samples of root from each species of plants were taken randomly and therefore the total protein fraction in each sample was estimated (Christie & Perry, 1951; Lowry et al., 1951; Chatterjee & Sukul, 1981; Sukul, 1987; Datta, 1999; Datta, 2005;). All the info was counted for statistical analysis by analysis of variance ($P \geq 0.01$).

2.5 Recipe for Consumption

The vegetables and fruits plants; amaranth, cucumber, cowpea, and okra, are tasty delicacy found in many dishes, making it quite versatile vegetable, and consumed during a sort of ways and may be utilized in salads, soups, stews and sauces, chopped, sliced, fresh or dried, fried or boiled (Kochlar, 1986; Annor et al., 2014; Kumaraswamy, 2016; Agatemor et al., 2018; Govender, 2020).

2.6 Processing Methods

Different processing methods of vegetables and fruits plants; boiling, sprouting, steaming, frying, soaking, de-hulling, and grinding, are often combined to supply different meals (Annor et al., 2014). However, there's information available on the standard and dietary characteristics of fresh vegetables-fruits, which are occasionally utilized in folk diets in some southern European countries (Fabbri & Crosby, 2016). Cooking and sprouting of legumes greatly alters the properties and bioavailability of some nutrients, and a number of other metabolic enzymes, like proteinases, are activated during this process, which results in the

discharge of amino acids and peptides to synthesize new proteins (Devi et al., 2015; Govender, 2020).

2.6 Healthcare Science and Technology Communication Food Security Economy

The activity of scholars, researchers, regulators, teachers, staff, community, photographers, visitors, different scientist, academicians, clinicians, administrators, institutions, farmers, NGO named 'Burdwan Green Haunter and Students' Goal', and media personnel, -campaign or -aware or -make the news or -publication regarding the importance of "Vegetables and Fruits act as Potential Cost-Effective Personalized-Biomedicines Social-Vaccine against COVID-19: Improved Immunity Food-Security Green-Economy Science-and-Technology-Communication Applications and Nutritious foods-, Healthcare-, Defense response- and Immunity-also as Biodiversity Conservation- Issues" in several audiovisual media (TV channels), social media, web pages, newspapers, and journals, are recorded. It's a platform to market and discuss different new issues and developments by publishing case reports altogether aspects of Clinical Medicine for everywhere the world (Datta et al., 1997; Datta et al., 1998; Datta, 1999; Datta & Datta, 2000; Datta et al., 2000; Datta, 2005; Datta, 2006; Datta & Datta, 2012; Datta & Datta, 2013; Datta & Datta, 2016; Datta, 2016; Datta, 2019a; Datta, 2019b; Datta, 2020a; Datta, 2020b; Datta, 2020c; Datta, 2020d; Datta, 2020e; Datta, 2020f; Datta, 2020g).

2.7 Future Suggestions in Research

It will be achieved from typical analysis or justifications of literature review, research articles, specifies hypotheses, backgrounds, and problems. Emphasize the new and important aspects of the experimental findings and the conclusions. Then new hypotheses will arise and clearly label them as such trials for education and prevention are the ultimate keys to extending good health and nutrition globally (Datta, 2016; Datta, 2019a; Datta, 2020a).

3 Results

Results mentioned in table 1, shows that the susceptibility of vegetables and fruits plants infected with Root-Knot and Mosaic Virus diseases during a multiple intercropped field by analysis of variance ($P \geq 0.01$). Here amaranth and cucumber received maximum infection of Root-Knot and Mosaic Virus, and amaranth and cucumber, were more susceptible plant than cowpea and okra plants, and determines the results on pathogens-infected-diseases; Root-Knot and Mosaic-Virus, in terms of the typical number of; root-gall number, nematode population in root, leaves /plant, Mosaic-Virus-infected leaves/plant (%), biomass of shoot and root, length of shoot and root, average root and fruit protein content (%), forming the "Eco-Friendly-Highly-Economical-Potential-Biomedicines-Cover-Catch-Weed-Vegetable-Fruits-Crop-Plants". On the opposite, okra and cowpea act as a "Diseases-Resistant-Biomedicine-Vegetables"-crop against naturally pathogens-infected-diseases by analysis of variance ($P \geq 0.01$), though all the four plants were liable to root-knot nematodes and foliar diseases. While, *M. incognita* population increased significantly both within the soil likewise as in roots in 65 days. But okra showed very cheap intensity of nematode infection (Table 1).

3.1 In Future Suggestions in Research

The results fulfill the goal of research suggestions as proposal because the consumption of the multiple-intercropped vegetables-fruits plants; amaranth, cucumber, cowpea, and okra plants, use as potential biomedicines, must justify future research.

3.2 In Healthcare Medical Sciences and Technology Communication Food Security

The students, researchers, teachers, staff, community, photographers, visitors, different scientist, administrators, institutions, farmers, NGOs, and media personnel campaign,

Table 1 Susceptibility of vegetables and fruits plants infected with Root-Knot and Mosaic Virus diseases in a multiple intercropped field

Plant species	Ratio: Control / Infected								Nematodes (populations)		
	Leaves /plant	Mosaic Virus infected leaves /plant (%)	Average shoot		Average root		Average protein (%)		Root galls / plant	Soil (200g)	Root (2g)
			Length (cm)	Weight (g)	Length (cm)	Weight (g)	Root	Fruits			
Amaranth	0.97 ^c	0.95 ^d	1.58 ^a	1.93 ^a	1.83 ^b	0.25 ^c	0.53 ^c	1.06 ^c	4435.62±14.02 ^a	112.02±2.92 ^a	2276.74±12.22 ^a
Cucumber	0.89 ^c	1.41 ^c	1.51 ^a	1.99 ^a	3.42 ^a	0.23 ^c	0.51 ^c	1.18 ^b	586.93±05.01 ^b	112.02±2.92 ^a	1586.97±04.29 ^b
Cowpea	1.06 ^b	1.72 ^b	1.38 ^b	1.29 ^b	1.28 ^c	0.58 ^b	0.80 ^b	1.04 ^c	98.27±09.03 ^c	112.02±2.92 ^a	478.96±02.82 ^c
Okra	1.10 ^a	1.91 ^a	1.07 ^c	1.12 ^a	1.13 ^c	0.99 ^a	0.93 ^a	1.51 ^a	21.04±10.12 ^d	112.02±2.92 ^a	28.93±09.03 ^d

Value given are average of five replicates; mean ± SE value followed by the different letter in same vertical column are significantly different according to Duncan's multiple range test ($P = 0.01$)

aware, discuss, arrange workshops and seminars, make news and publish as abstract regarding the importance of “COVID-19 Cost-Effective Social-Vaccine Develop from Potential Vegetables-Fruits-Biomedicines: Improving Immunity Healthcare Medical Sciences and Technology Communication Food-Security Green-Economy Applications, and Nutritious foods-, Healthcare-, Defense response- and Immunity- yet as Biodiversity Conservation- Issues”, in numerous national- and local-audiovisual media (TV channels), different social media, web pages, newspapers and different -national and -international Journals further as Congress Proceedings also.

4 Discussions

4.1 In Unidirectional Common Thread Healthy Diet Prevention COVID-19

The cost-effective fresh weed, vegetables and fruits; amaranth, cucumber, cowpea and okra, qualify as an ideal nutritious food source for people of low income-food deficit countries, and these are used to make medicine, -“Aid to Eating and Staying Healthy during COVID-19”, to provide food for immunity (Annor et al., 2014; Devi et al., 2015; Pulipati et al., 2014; Gemede et al., 2015; Fabbri & Crosby, 2016; Kumaraswamy, 2016; Agatemor et al., 2018; CABI, 2020; Datta, 2020d; Datta, 2020e; Datta, 2020f; Datta, 2020g; Govender, 2020; Guleria & Srivastava, 2020; ISAAA Shares, 2020).

4.2 Advantages of Weed-Vegetables and Fruits as Biomedicines

4.2.1 Potential Catch Crop

It is evident from the observation that amaranth, cucumber, cowpea and okra plants were highly susceptible to Root-Knot (RK) and Mosaic-Virus (MV). But, here amaranth and cucumber received maximum-infection of Root-Knot and Mosaic Virus, and were more susceptible plant than cowpea and okra plants, and determines the effects on pathogens infected diseases in comparison to inoculated naturally infected plots. Though, all the plants, are very good hosts of these Root Knot nematodes as well as foliar MV pathogens (Datta et al., 1997; Datta, 1999; Datta et al., 2000; Roossinck, 2001; Datta, 2005; Datta, 2006; Datta & Datta, 2013; Anonymous, 2015; Datta & Datta, 2016; Datta et al., 2016; Datta, 2016; Datta, 2019a; Datta, 2019b, Datta, 2020d). However, root-knot nematodes liked to feed on amaranth and cucumber rather than cowpea and okra when it had a choice, forming the “Eco-Friendly-Highly-Economical-Potential-Biomedicines-Cover-Catch-Weed-Vegetable-Fruits-Crop-Plants”. Here both the amaranth and cucumber root system colonizes and occupies the large area, it is likely that the plant-parasitic nematodes will preferably be found in its roots (Datta et al., 1997; Datta, 1999; Datta et al., 2000; Datta, 2005; Datta, 2006; Datta & Datta, 2013;

Datta & Datta, 2016; Datta et al., 2016; Datta, 2016; Datta, 2019a; Datta, 2019b, Datta, 2020d). In other words, amaranth and cucumber could serve as a good potential catch crop thereby reducing pathogens infection of other vegetables. On the other hand, okra and cowpea act as a “Diseases-Resistant-Biomedicine-Weed-Vegetables-Fruits-Crops”- against naturally pathogens-infected-diseases.

4.2.2 Double Benefits

In multiple-intercropping, land equivalent ratio, benefit-cost ratio, and monetary advantage index are used to assess the productivity and its economic benefits. The farmers would be benefited double; by controlling root-knot diseases, and by buying and selling the amaranth, cucumber, cowpea and okra (Datta et al., 1997; Datta, 1999; Datta et al., 2000; Roossinck, 2001; Datta, 2005; Datta, 2006; Datta & Datta, 2013; Anonymous, 2015; Datta & Datta, 2016; Datta et al., 2016; Datta, 2016; Datta, 2019a; Datta, 2019b, Datta, 2020d).

4.2.3 High Tolerance to Environmental Stresses

The influence of environmental factors on vegetables and fruits to temperature, solution pH, moisture stress, depth of emergence, hexavalent chromium-Cr (VI) stress, drought, nickel and use dual crop are high (Thomas et al., 2009; Bashri et al., 2016; Massawe et al., 2016; Datta, 2016; Datta, 2019a; Datta, 2020d).

4.2.4 Food Security in Agriculture for Climate Change and Chemicals' Usage

Plants growth directly increases with photosynthesis and stomatal activity, conserves solar energy in the glucose, and significantly reduces CO₂ in the climate. So we can say that both plants might have induced synthesis of many new proteins which increase photosynthesis have stimulated increased photosynthesis rate, stomata-activity, and water retention capacity plants by inducing defense response (Datta, 2005; Datta, 2006; Datta & Datta, 2013; Datta & Datta, 2016; Datta et al., 2016; Datta, 2016; Datta, 2019a; Datta, 2019b, Datta, 2020d). These results may suggest that plant diseases might be effectively controlled by the amaranth and cucumber plants as a ‘Potential Cover Vegetables CatchCrops’. It is a new and more efficient solution, technologies, products and it has to fulfill its food and nutrition requirement (Datta, 2019a; Datta, 2020c; Datta, 2020d), which indirectly influence climate change and resource productive economies enriching quality of midday meal as well as the agricultural sector in food security (Datta, 2005; Datta, 2006; Datta & Datta, 2013; Datta & Datta, 2016; Datta et al., 2016; Datta, 2016; Datta, 2019a; Datta, 2019b, Datta, 2020d). The fertilizers-pesticides, plus improvements within the crop input use efficiency could minimize greenhouse gas emissions while protecting the environment. Sustainable

agriculture holds promise for humankind and therefore the planet Earth, and it will be successful if all developed and developing nations stand together to hunt 'our common future' to provide more food while generating less environmental pressure (Shah & Wu, 2019).

4.2.5 Consumption of Weeds-Vegetables and Fruits with Genetic Improvements for Prevention 21st Century Epidemiological Diseases

Amaranth, cucumber, cowpea and okra are the older widely cultivated, for both medicinal and culinary oligo-purpose, the cost-effective fresh vegetables-fruits, qualify as an ideal safe food for people of low income countries and also has economic viability, and it is easily available in all regions, low priced, seed, oil, and leaf are used as food, -"Aid to Eating and Staying Healthy during COVID-19", to provide nutritious food and immunity, fruits or entire plants are used to make modern medicine, resisting different diseases; analgesic, diuretic, antifungal, vermifuge, antiulcer, laxative, antiviral, asthma, ulcers, diarrhea, swelling of the mouth or throat, and high cholesterol and hypertension, hepatoprotective and antioxidant activities, and it is developed a blueprint for diagnostics, vaccines, and therapeutics against novel coronavirus (Ware, 2019; Datta, 2020c; Datta, 2020d; Datta, 2020e; Datta, 2020h; Govender, 2020; WHO, 2020f), forming the 'Nature's Gift to the poor human disease-free healthy life' multipurpose crop (Sindhu & Puri, 2016; Kuete et al., 2017; Jayatilake et al., 2018; WHO, 2020a; WHO, 2020b), consumed in a variety of ways, fruits rich in vitamins, calcium, folic acid, carbohydrates, phosphorus, magnesium and potassium, iodine, and other mineral matters, and a good source of superior nutritional quality -oil and -protein, unsaturated fatty acids such as linoleic acid, and makes them easier to digest, and have several active constituents like tannins, resins, reducing sugars and amino acids. The methanolic leaves extract was reported for the presence of rutin and quercetin. It also possess spinosterol (24-ethyl-22-dehydrolathosterol) as a major component along with 24-methylathosterol 24- ethyllathosterol, 24-methyl-22- dehydrolathosterol, 24-ethyl cholesterol and 24-ethyl-22-dehydrocholesterol as minor components in sterol fraction. The roots of *A. viridis* possess a steroidal component, amasterol (24-methylene-20-hydroxycholesta- 5,7-dien-3 β -ol). Amaranth is also known for several potential pharmacological properties-health beneficial effects on human diseases, like cardiovascular disease, type 2 diabetes, kidney diseases, skin infection, digestive diseases, some cancers, antibacterial, antioxidant, nootropic, eye, body immunity, blood pressure, obesity, asthma, constipation, cancer, heart disease, obesity, osteoporosis, gastrointestinal health, sexual health, and neurological disorders, etc., (Annor et al., 2014; Anonymous, 2015; Sindhu & Puri, 2016; Agatemor et al., 2018; Gondwe et al., 2019; Datta, 2020c; Datta, 2020d; Datta, 2020g; Datta, 2020h). Among the diverse wild gene pool of weeds,

vegetables and fruits holds the resistant source of gene for many biotic stresses, diseases and pests infestation, and resistant gene transfer, and also on germplasm (Pulipati et al., 2014; Boukar et al., 2019; Datta, 2020c; Datta, 2020d; Datta, 2020g; Datta, 2020h).

4.2.6 Defense Resistance and Soil Enrichments with Economic Benefits

The positive effects of the expansion of both okra and cowpea plans is also accountable for defense resistance against other plant pathogens (Datta, 2005; Datta, 2006; Datta & Datta, 2013; Datta & Datta, 2016; Datta et al., 2016; Datta, 2016; Datta, 2019a; Datta, 2019b, Datta, 2020d). It's been reported that cowpea root-nodes increase soil nitrogen by biological organic process and therefore the amounts of N transferred to associated non-leguminous crops-okra determines the extent of advantages. In intercropping, land equivalent ratio, benefit-cost ratio, and monetary advantage index are wont to assess the productivity and its economic benefits (Massawe et al., 2016; Olowolaju & Okunola, 2017).

4.2.7 Stability and Persistence of Coronavirus on Vegetables-Fruits and Food Items

There is no evidence of food borne transmission of COVID-19 to date that corona viruses being transmitted via food or food packaging, and it cannot multiply in food; they need an animal or human host to multiply, and did not expect that certain foods needed to be withdrawn (CDC, 2020a; CDC, 2020b; CDC, 2020c; FDA, 2020b; FSS, 2020; WHO, 2020h; WHO-FAO, 2020). Recently, many incidents highlighted frozen foods as carriers for the long-range transport of coronavirus, and low temperatures could dramatically prolong the persistence, frozen and refrigerated foods, contamination risk, fish, meat, poultry, and swine skin, during 14–21 days or more. The contaminated cold-storage foods may present a systematic risk for SARS-CoV-2 transmission between countries and regions (Casanova et al., 2010; CGTN 2020; Han et al., 2020; SMHC, 2020).

4.2.8 Food Safety and Prevention strategies to Transmission Coronavirus

It is reported that one cough can produce up to three thousand droplets, and therefore the coronavirus can remain active and possibly infectious for 3 hours in airborne droplets, which might also land on objects and surfaces around the vegetable moreover as a person, and people infected by touching these objects or surfaces. Coronavirus survive on different surfaces; it lasted up to four hours on copper alloys, it can survive on plastic, stainless-steel and countertops for up to 3 days (72 hours), the longest of all the materials, and is additionally detectable on cardboard for up to 24 hours, and it's also a decent indicator for other porous material like cardboard, like fabric and paper (Hammett, 2020). In the context of

this situation, biosafety and biosecurity measures that focus on 'One Health' aspects of the disease outbreaks and so the COVID-19 spread are of great importance to restrain this pathogen along with these efforts, standard precaution and control measures should even be taken at the private and community level to prevent the spreading of any contagion diseases, including COVID-19, which specialize in the importance of biosafety, biosecurity, 'One Health' approach, which concentrate on recent developments and also the ways forward to forestall and control COVID-19 during a useful way (Ahmad et al., 2020; Bonilla-Aldana et al., 2020; Tiwari et al., 2020).

The effective food safety management systems are important for preventing infection-transmission COVID-19 via food and survival on food packaging materials. Cleaning, sanitation, good hygienic practices, and active packaging are needed from farm to fork (Dhama et al., 2020a; FAO & WHO, 2020; Olaimat et al., 2020; Shariatifar & Molaei-Aghaee, 2019; WHO, 2020i; WHO, 2020j; Unhale et al., 2020). Though, in China, supported their food health and risk perceptions of healthy and risky food, the respondents' general attitudes are positive toward organic food but relatively negative toward game meat. However, the likelihood of its impact on older generations' future changes in diets is smaller, which means that older generations' food beliefs are more stable (Xie et al., 2020; Zhang et al., 2020). So, the coronaviruses can already be inactivated at relatively low temperatures (Abraham et al., 2020; Hesslin et al., 2020). Traceability in food manufacturing can range from in-house traceability to whole or consumer, merchandise. Well-thought-out traceability systems are fundamental to achieving optimal benefits from internal control, production control, and for fulfilling consumer demands etc. and traceability strategy in food industries (Moe, 1998; Olsen & Borit, 2013). Consuming unpackaged or uncovered foods, consumption of boiled or canned foods processed at high temperatures should be done, and nano-encapsulated materials are effective in protecting weeds-vegetables and fruits, and packaging from SARS-CoV-2 contamination (Ceyla et al., 2020). FDA (2020a) helps by supplying of sterilizers, disinfectant devices, and air purifiers. Sterilizers to be utilized; in health care to render medical devices sterile (i.e., free from viable microorganisms), ranging from small table-top sterilizers to large sterilizers intended for large loads, and modality by steam, ethylene oxide, vaporized peroxide, etc. or by bacterial spores, include chemical/physical disinfectant devices, and ultraviolet (UV) disinfectant devices, which are devices that use UVA or UVC light to provide a germicidal effect. Air purifying devices are intended for medical purposes to kill pathogens/microorganisms within the air by exposure to UV radiation or remove them through filtration (FDA, 2020a).

In general, coronavirus will be inactivated within a second by disinfecting surfaces with products containing 62-71% alcohol. Key surfaces to disinfect reception regularly are: phone,

computers, keyboards, iPads, kitchen tops, shared utensils, taps, and also the flush handles within the bathroom, light switches, door handles, and bedside tables. we will also minimize spread by wearing (surgical) gloves, wearing medical masks when shopping (<https://bit.ly/3bQwExL>), staying at home, self-isolating from anyone in your household who is displaying symptoms, and avoiding populated places when exercising/getting fresh air, and decontamination of surgical face masks and N95 respirators by dry heat pasteurization for one hour at 70°C (Hammett, 2020; Xiang et al., 2020).

4.3 Development of Ideas as Potential Biomedicine against COVID-19

4.3.1 From Genetic Similarity

We're not completely human, the genetic material inside our cells; 100 forty-five genes from animals, and in 'Genome Biology', the numerous genes that gave the impression to be transferred from bacteria, archaea, fungi, other microorganisms, and plants to animals. In the case of humans, they found hundred forty-five genes have jumped from simpler organisms (Williams, 2015) and underpinning all organisms (Appels et al., 2015). Approximately, fraction of the human genome of virus-DNA (Science Daily, 2016), shows the inter-individual variation (On Biology, 2019), "The Human Genome Is full of Viruses and our body requires viruses, but viruses don't always require a body" (Callif, 2020).

4.3.2 From Genetic and Immune Resistance Mechanisms

It is reported, "Genetic Resistance to Coronavirus Infection- A Review", three host resistance mechanisms: genetic control at the extent of the, -cellular receptors, -macrophage and -acquired immunity (Buschman & Skamene, 2019). SARS-CoV-2 is that the etiological agent to blame for the pandemic COVID-19 outbreak and therefore the main protease (Mpro) of SARS-CoV-2 could be a key enzyme that plays a very important role (Zhang et al., 2020). When the figure is attacked by germs, the system kicks into gear to repulse the assault (The Gene, 2020).

4.3.3 From Traditional Medicine

During the initial stages (December 2019) of the outbreak of COVID-19 in Wuhan city, Hubei province, China, Traditional Chinese Medicine (Yang et al., 2020) was considered to be the source of virus or wake of the coronavirus pandemic (Gorski, 2020), as it contains products from wildlife; like 'Tan Re Qing' from bear bile powder (Fobar, 2020), scales of pangolins, and tiger (Standaert, 2020; Vyawahare, 2020), bovine pill, gallstone of cattle, buffalo horn, jasmine and pearl etc., (Wee, 2020). But, in the evolution, the 70%- 80% population is primarily dependent on traditional medicines and the innate response of the patient's

immune system, highlighting anti-microbial peptides as the host's own defense molecules, and it could be used as potential therapeutic agents. The World Health Organization, Africa, also welcomes innovations around the world for potential treatments for COVID-19, and develops vaccine by using 'Plant-based Technology' (CBU, 2020b; Gómez et al., 2019; IUCN, 1993; WHO, 2020b; Yatoo et al., 2020).

4.3.4 From Human Immunomics Initiative

Human Immunomics Initiative (HII) aims, how the human immune system fights disease with advances in computing and artificial intelligence, genomics, systems biology, and bioinformatics (Sweeney, 2020), following the guideline of WHO entitled "Vaccine-preventable diseases and vaccines" (WHO, 2020c), and the long-stay stress in emergencies (Bougrine et al., 2019), with harmonized clinical trials, are aimed to accelerate licensure and distribution by the public-private partnership and platform (Corey et al., 2020), due to more humid climates and summer weather will not substantially limit pandemic growth (Baker et al., 2020)..

4.3.5 From Nature of Binding

The coronavirus, enters human cells by binding of its viral spike protein to the membrane-bound form of them aminopeptidase angiotensin-converting enzyme 2 (ACE2) (Buschman & Skamene, 2019; Roujian et al., 2020), protease inhibitors, and angiotensin-receptor, thus increasing the availability of target molecules for SARS-CoV-2 (Hoffmann et al., 2020; Soler et al., 2008; John et al., 2020). The T cells-immune warriors help us fight, because they were previously infected with other coronaviruses (Leslie, 2020), by 'Antibody Testing for COVID-19' by which designer antibodies could battle (Abbasi, 2020; Cohen, 2020c).

4.3.6 From Antigenic Epitopes

It is reported that deep serological profiling of COVID-19 patients and pre-COVID-19 era controls using VirScan revealed over 800 epitopes within the SARS-CoV-2 proteome, including 10 epitopes likely recognized by neutralizing antibodies for improving diagnostics, therapeutics, and vaccines (Shrock et al., 2020), and also the antigenic epitopes could constitute an economical and safe alternative to virus (Brennan et al., 2001).

4.3.7 From Viral Nano-Biotechnology

It is an emerging and interesting field, and plant virus-based nanoparticles are explored for several years either to precise subunit vaccines or as epitope presentation systems, and are developed for imaging, drug delivery, and therapeutic applications (Hema et al., 2019).

4.3.8 From Coronavirus Updated Dashboard

Scientists say that novel coronavirus forming a world crisis (Nicks et al., 2020). So, it's to wish

'Modeling of Coronavirus Infection' (Beverly, 2020), 'WHO-Timeline and Dashboard Updated' (WHO, 2020c; WHO, 2020d; WHO, 2020e) and by using computing (AI) software (Robert, 2020), and therefore the global collaboration to accelerate the event, production and equitable access to new COVID-19 diagnostics, therapeutics, and vaccines (WHO, 2020a).

4.4 Emergency Most Applicable Suggestions-Potential Global-COVID-19-Vaccine

Plant-based vaccines offer several advantages over the standard systems like cautions and opportunities for botanicals in COVID-19 patients (Dhama et al., 2020b; Firenzuoli et al., 2020), simple production, storage, higher yields, stability and safety, and advantages in comparisons, prospects, and challenges or constraints within the production of plant-based vaccines and antibodies (Dhama et al., 2013; Dhama et al., 2020b; Parvathy, 2020). Now, the results and discussion fulfill the goal for the research suggestions.

4.4.1 Idea-I

In biomedicines, the Mosaic Virus of weeds-vegetables-fruits plants; amaranth, cucumber, cowpea, and okra plants Mosaic Virus, could also be utilized in vaccine formulations to control immune function against coronavirus, which has been developed as antigenic-epitopes (Shrock et al., 2020) derived from the vaccine targets COVID-19 infectious disease agents, and therefore the chimeric virus particles (CVPs) could represent an economical and safe alternative to measure replicating coronavirus vaccines (Brennan et al., 2001). And it's going to be effective by the humoral and cellular immune responses generated by these CVPs following both parenteral and mucosal delivery and highlight the potential of CVPs to elicit protective immunity from COVID-19 infection (Hema et al., 2019; Kuete et al., 2017; Datta, 2020b; Datta, 2020d; Datta, 2020c; Datta, 2020f; Parvathy, 2020). These plant virus-based nanoparticles are attracting the eye of researchers and clinicians for emerging, drug delivery, and therapeutic applications (Hema et al., 2019). Here, vaccination or treatments, is that the use of remedies against diseases either earlier in a pestilence or given routinely to forestall diseases. When the latter is employed it involves mostly the users similar to any conventional vaccination which administers the antigen in an inactive state to achieve immunity towards the disease and is given before the onset of disease or disease symptoms in a private as a prevention instead of cure (Rajput, 2012). It's obligatory that information on ClinicalTrials.gov, a resource provided by the U.S. National Library of drugs (NLM), to the National Institutes of Health

(NIH) or other agencies of the U.S. central, is provided by study sponsors and investigators, and that they are to blame for ensuring that the studies follow all applicable laws and regulations (NIH, 2017; Kaiser, 2020; Sweeney, 2020). It's also studied the cost-effectiveness of emergency care interventions, in low and middle-income countries like India (Brennan et al., 2001; Bio Spectrum News, 2020; Werner et al., 2020). But it'll not only be cost-effective but also easily available and prepare able, higher yields, stability and safety still as and safe alternatives to measure replicating COVID-19 vaccines (Bio Spectrum News, 2020; Parvathy, 2020; Robert, 2020; Werner et al., 2020; WHO, 2020b; WHO, 2020c; WHO, 2020d; WHO, 2020e; WHO, 2020g).

4.4.2 Idea-II

The combined weeds-vegetables-fruits; amaranth, cucumber, cowpea, and okra (fresh or cooked) is also consumed as biomedicines @ 150g total (one and half cup) (150g = 25g amaranth + 50g cucumber + 25g cowpea + 25g okra) twice daily (during taking meal) for a minimum of 6-weeks, against present coronavirus infections 45-days before the symptom onset OR illness onset (as a vaccine) OR onset of symptoms (if possible) -associated COVID-19 infections are reported (treatments) (Bio Spectrum News, 2020; Datta, 2020b; Datta, 2020d; Datta, 2020e; Datta, 2020f; Datta, 2020h). The edible biomedicine-weed amaranth or okra may additionally be directly personal-used for "Clinical Trial or as a possible Global-Vaccine" after getting permission from the WHO, Clinical Trials.gov., U.S., NLM, and NIH (NIH, 2017; Kaiser, 2020; Sweeney, 2020). The combined weeds-vegetables-fruits, are the most; cost-effective, easily-available, safe-edible, and easily-prepare able likewise as and safe alternative to measure replicating COVID-19 vaccines (Rajput, 2012; Bio Spectrum News, 2020; Datta, 2020a; Datta, 2020b; Datta, 2020c; Datta, 2020d; Datta, 2020e; Datta, 2020f; Datta, 2020g; Datta, 2020h; Parvathy, 2020; Robert, 2020; Staff Reporter, 2020; Werner et al., 2020; WHO, 2020b; WHO, 2020c; WHO, 2020d; WHO, 2020e; WHO, 2020g).

4.4.3 Suggestions for Emergency Applications of Global-COVID-19-Vaccine

4.4.3.1 For Body's Defenses against Coronavirus Pathogens

Eating weeds-vegetables-fruits based healthy diet with viosterol is extremely important during the COVID-19 pandemic because affect our body's ability to stop, fight and get over coronavirus infections by improving supporting immune systems which is reported within the 'Genome Biology and Evolution', these genetic changes may have sharpened the body's defenses against the pathogens (Datta, 2020a; Datta, 2020b; Datta, 2020c; Datta, 2020d; Datta, 2020e; Datta, 2020f; Datta, 2020g; Datta, 2020h; Lanham-New et al., 2020; NDTV FOOD, 2020; Parvathy, 2020; Ul et al., 2020).

4.4.3.2 For Weeds-Vegetables-Fruits Based Vaccines Offer Several Advantages

Some conventional vaccines though effective, have high production costs, involve tedious purification processes, and have biosafety issues, requiring time-consuming biosafety tests for commercial production. But plant-based vaccines and antibodies offer several advantages, like simple production, storage, higher yields, stability, and safety (Aoust et al., 2010; Bougrine et al., 2019; Capell et al., 2020; Drug Target Review, 2020; Filetti, 2020; Kaiser, 2020; NIH, 2017; Mani et al., 2020; Parvathy, 2020; WHO, 2020a; WHO, 2020b; WHO, 2020c; WHO, 2020d; WHO, 2020e; WHO, 2020g).

4.4.3.3 Tobe Used as Potential Personalized Vaccines

There is a large international effort underway to develop diagnostic reagents, vaccines, and antiviral drugs in a very bid to cut down the spread of the disease and save lives, with a rapid supply of vaccines and antiviral drugs for the emergency manufacturing and application against COVID-19 (Capell et al., 2020; Werner et al., 2020), by inducing a potent immune reaction through both humoral and cellular components of the system (Aoust et al., 2010; Cohen, 2020a; Cohen, 2020b; Cohen, 2020c; Raw, 2020; WHO, 2020a).

4.4.3.4 For Cost-Effective Potential Global-Personalized-Vaccine

The weeds-vegetables-fruits should be used as a potential emergency-care cost-effective personalized-biomedicine 'Vaccine or Social-Vaccine for all' because it resists and change unhealthy pandemic social and economic structures and useful metaphor for health promotion (Baumi et al., 2009; Aoust et al., 2010; Raw, 2020; Werner et al., 2020; WHO, 2020a), because it sharpened our immune system (Gibbons, 2020), and the SARS-CoV-2 genome can provide useful information, on how drugs targeting other coronaviruses may improve outcomes for COVID-19 patients (Back, 2020). And the World Health Organization and other international organizations have set up a system to accelerate and equitably distribute vaccines, "the COVID-19 Vaccines Global Access (COVAX) Facility" (Blumenthal et al., 2020; Editorials, 2020; Filetti, 2020; Kupferschmidt, 2020; Martin, 2020), for preventing any controversy, with the "Biosimulation- can help to achieve the COVID-19 vaccine development" by avoid the dangerous rush for vaccines (Black, 2020).

5 Future Approach in Research

It will be achieved from typical analysis or justifications of literature review, which are the ultimate keys to extending good health and nutrition globally (ISAAA Shares, 2020; WHO, 2015; WHO, 2020c). In the future, combination of 'Weeds-Vegetables-Fruits' may not only be 'Potential Economical Crop' against various pathogens in agriculture, but also it is one of the milestone events

amidst many important changes in the past decade that have necessitated formulation of a new-outlook-and-strategy for preventing-“Future Pandemic Pathogens of 21st Century Advances Research Diagnosis Treatment Control Enriching Food Security Biodiversity Agriculture Green Socio-Economy Medical Science and Technology Communication Applications Innovation Issues”, based on the theme “Vision 2040” that would help policy-makers to develop the “Potential Cost-Effective Green-Economical Emergency Potential Global-Vaccine specially for poor or Social-Vaccine Biomedicine against COVID-19 with Safe and Elicits Significant Immune Responses”, and it resists and change unhealthy pandemic social and economic structures with the help of NGO, which may be ‘Future Social Vaccine’ (Baumi et al., 2009; Black,2020; Datta, 2020a; Datta, 2020b; Datta, 2020c; Datta, 2020d; Datta, 2020e; Datta, 2020h; Kupferschmidt, 2020; Martin, 2020; Thorp, 2020).

Conclusions

The combination of ‘Weeds-Vegetables-Fruits’ may not only be ‘Potential Economical Crop’ against various pathogens in agriculture, but also it may be forming the “Eco-Friendly Highly-Economical Potential Biomedicines Cover Catch Vegetable-Fruits Crop-Plants”, conserving “Biodiversity-Conservations-Sustainable-Climate-Health-Development-Green-Socio-Economic-Implications-Agriculture”, and the farmers would be benefited-double; by controlling-diseases, and by buying-selling. In biomedicines, vegetables-fruits or the plant-Mosaic-Virus has been developed as antigenic-epitopes derived from the vaccine-targets-COVID-19 infectious-epidemic-disease-agents, and the chimeric-virus-particles, use in vaccine-formulations or treatments, as one of the most-powerful cost-effective emergency healthcare easily-available safe-edible prepare-able easy-applicable future-personalized-potential-biomedicines act as “Preventive Measures and Safe Alternative to Live Replicating COVID-19 Vaccines”, by increasing our immune system, which is one of the milestone events amidst many important changes in the past decade that have necessitated formulation of a new-outlook and strategy for preventing-“Future Pandemic Pathogens of 21st Century Advances-Research Diagnosis Treatment Control Enriching Food Security Biodiversity Agriculture Green Socio-Economy Medical-Science and Technology-Communication-Applications-Innovation-Issues”, based on the theme “Vision 2040” that would help policy-makers.

Conflicts of Interest

The authors declare no conflict of interest. The idea was conceived by Datta SC and his higher secondary students and written by the author itself.

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