

RESEARCH ARTICLE

**Weed Plant Act as Vaccine against Plant and COVID-19 Diseases: Enriched
Agriculture Health Development Socioeconomy Sciences Technology
Communication Application**

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ABSTRACT

Backgrounds: Food production reduces significantly in agriculture, particularly in the developing world due to different plant diseases, caused by naturally infected-pathogens. On the other hand, recent epidemic coronavirus disease 19 (COVID-19) disease caused by novel coronavirus pathogens spreads around the world forming total change of human civilization, health, travel, socioeconomic, education, and clinical research, which has no specific therapeutics, and effective treatment. Although the middle and upper classes are able to manage, but the low-income households are really suffering. Hence, the Government of India wants to reorient the COVID-19 crisis by developing a policy initiative. Now, it is focused on the consumption of nutritious as well as traditional medicinal vegetables, for preventive measures against diseases as vaccine. In plant diseases, though pesticides are the most effective means of control, they are costly and not environment friendly. Hence, it has been an urgency to require; new and more efficient solutions, technologies, products to fulfill its food and nutritional requirement, and methods to develop the best vaccines to control the coronavirus – COVID-19 – disease and prevent more damage.

Materials and Methods: Hence, it is focused on the amaranth plant, intercropped with okra plant, to determine the effects on pathogens infected diseases of both plants; root knot, mosaic virus, and leaf curl virus in a well-protected garden. **Results and Discussion:** After harvesting, of the two plant species, amaranth received maximum pathogen infection, forming the “Potential Eco-friendly Highly Economical Biomedicines Catch Vegetable Crop Plants,” conserving “Biodiversity Conservations Sustainable Climate Health and Development with Important Socioeconomic Implications in Agriculture,” though both are highly susceptible to diseases, and the farmers would be benefited double; by controlling diseases and by marketing. **Conclusion:** In biomedicines, the plant virus of the highly trace-tolerance amaranth-vegetables; amaranth mosaic virus, okra yellow vein mosaic virus, amaranth leaf curl virus, and okra enation leaf curl virus, have been developed as antigenic epitopes which derived for the vaccine targets COVID-19 infectious epidemic disease agents, and it is the live replicating COVID-19 “Vaccines,” enriching food security green economy medical science and technology communication applications issues. Now, it is planned to publish as suggestions; the use of amaranth as biomedicines, and okra as future biomedicines, based healthy diet and greater prevention against SARS-CoV-2, by boosting our immune system which may significantly solve, “Amaranth Plant Protects Climate Health Development Socioeconomy Sciences

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Technology Communication: Act as Potential Biomedicine Vaccine against Plant Disease and 21st Century Epidemic COVID-19-Diseases” to access the pharmacological developments globally.

Keywords: Plant and COVID-19 diseases, Socioeconomy sciences technology communication application, Vaccine, Weed plant

INTRODUCTION

Epidemic problems

Recent threatening,^[1] epidemic coronavirus disease 19 (COVID-19) disease caused by novel coronavirus pathogens spreads around the world forming total change of humanity with global health crisis,^[2] human challenge,^[3] human civilization,^[4] socioeconomic,^[5] travel,^[6] education, and clinical research^[7] with “the invisible patients.”^[8] Viral infections have always been of major concern in communities, health-care settings, and medical fields.^[9] The virus can also induce a dramatic inflammatory reaction, including in the brain, lungs, heart, gut, kidneys, blood vessels, and nervous system, among other tissues, forming recent danger.^[10] Now, diagnostics experts, public health officials, and epidemiologists are calling for a radical shift in testing strategy to identify and isolate infected individuals more quickly for safely reopening schools, factories, and offices.^[11] Moreover, the scientists have been an urgency to develop vaccines against coronavirus^[12] or find out the quickest and most efficient effective treatment pathway and prevention strategies.^[13] The fifth endemic coronavirus, forming humans health danger, leaps from animals,^[14] very closely related animal human virus,^[14] genetic resistance,^[15] divergence, structural and the future evolution, adaptation, and spread,^[16] prevails a long time as an asymptomatic patients,^[17] analogous to war, and the delay of every week in the deployment of a vaccine to the 7 billion humans on earth will cost thousands of lives.^[18]

Some solutions

Now, India emphasis on preventive measures by the cost-effective fresh vegetables, qualify as an ideal food source for people of low-income food deficit countries, seed, oil, and leaf is used as food, the weed amaranth plants (*Amaranthus viridis* L. cv. CO-1), “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; ulcers, diarrhea, swelling of the mouth or throat, and high cholesterol, and hypertension, and the World Health Organization (WHO) develops a blueprint for diagnostics, vaccines, and therapeutics against novel coronavirus,^[19] with a new research study used whole-genome sequencing for the development drugs to target the virus.^[20-23] Because *Amaranthus*, the fifth largest genus covers around 60 species throughout the world, caught the attention of biological and biomedical researchers for the presence of antiviral proteins specifically ribosome in activating proteins, exhibited N-glycosidase, DNase, RNase, and immunomodulatory activities,^[24] and it is imperative that the best vaccine economy^[25,26] and peptide are directly used for DNA virus control,^[27] molecular docking of novel COVID-19 protease with low-risk terpenoids compounds of plants,^[28,29] as well as and structural basis study^[26] and use algae to produce COVID-19 test kits^[30] due low-cost diagnostic test for novel COVID-19.^[31]

Major problems

The global food security crisis in COVID-19 is a significant problem,^[32] impact on amaranth seed oil market,^[33] and supply chain and import-export control to regional government policy and future influence on the industry.^[34] The naturally occurring root knot (RK) diseases caused by the nematode pathogens, *Meloidogyne incognita* (Kofoid and White, Chitwood, 1949), reduced production of weed vegetables amaranth and okra, adversely by amaranth mosaic virus (AMV) disease, okra yellow vein mosaic virus (OYVMV) disease, amaranth leaf curl virus (ALCV), and okra enation leaf curl virus (OELCV) disease, caused by the virus pathogens, 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 health hazards^[35,36] and the genetics resistance^[24,37,38] to AMV, OYVMV, ALCV, and OELCV in amaranth and okra, respectively, and diversity of viruses affects the production, financial losses, and climatic changes impact on the global economy also.^[39,40] A number of bioagents or bionematicides or biomedicine^[41-51] only stand as a suitable and useful against different plants, animals, and human diseases caused by pathogens. However, it remains some problems in the rapid depletion of natural resources, biodiversity conservation, and not cost effective.^[52,53] Then, it is thought that “Homeopathy” may solve all the above-mentioned problems.^[54-63] However, it has some cost. Only intercropping would help in identifying the “Susceptible Catch Vegetable Crop Plants” for possible control of plant diseases caused by different pathogens and it is primarily observed in the amaranth okra also.^[64-70]

Best solutions

The main aims and objectives are to find out the most suitable solution, a trial was planned to use of amaranth plant (*A. viridis* L.) cv. CO-1, as a “Susceptible Catch Vegetable Crop Biomedicine Plants,” intercropped with okra (*Abelmoschus esculentus* L. Moench) Cv. Ankur – 40, to determine the effects on pathogens infected diseases; RK, AMV, OYVMV, ALCV, and OELCV, in a well-protected garden. And to overcome the present epidemic of COVID-19 disease, it is planned to publish as suggestions, to take preventative measures or treatment opportunities, by consumption of the amaranth-based healthy diet as biomedicines, for greater prevention against COVID-19, by increasing the human immune system.

MATERIALS AND METHODS

Location and preparation of the field trial

The experiment was carried out in the garden of the Department of Zoology, Visva-Bharati

University, Santiniketan, West Bengal, India, at an ambient temperature of $25 \pm 2^\circ\text{C}$ and RH $75 \pm 5\%$.^[35,36,64-70] Soil was interchanged to keep the nematode population as uniform as possible with mixing manure (2:1 vol/vol). For uniform distribution, in the three inoculated plots, soil and root samples were taken at random to determine the extent and intensity of *M. incognita* pathogen infestation by mixing at $281,000 \pm 23,327$ J2/plot each (*M. incognita* juveniles).^[35,36,64-72] All the data were counted for statistical analysis by analysis of variance ($P \leq 0.05$).

Plantation

Aseptically germinated seeds of amaranth (*A. viridis* L. cv. CO-1) and okra (*A. esculentus* L. cv. Ankur-40) were planted alternately with a gap of 25 cm in the first two plots. There were 18 seedlings, 9 from each species of plants. The same design was followed in another two plots with amaranth and okra separately. The plots were un-inoculated amaranth okra, inoculated amaranth okra, inoculated amaranth, and inoculated okra.^[64-70] All the naturally infected diseases; RK, AMV, OYVMV, ALCV, and OELCV, occurred at 4-leaf stage of okra plants. All the data were counted for statistical analysis by analysis of variance ($P \leq 0.05$).

Harvesting

All the plants were uprooted 65 days after plantation of okra, and the following parameters of growth and pathogens infection were recorded: Average number of leaves/plant, the average number of disease; AMV, OYVMV, ALCV, and OELCV, infected leaves/plant (%), the average number of root galls/plant, the average number of nematodes (RK)/2 g of root and 200 g soil, average biomass (g) of fresh weight of shoot and root, and average protein % of root and fruits protein content. Three samples of root from each species of plants were taken at random and the total protein fraction in each sample was estimated.^[35,36,71-74] All the data were counted for statistical analysis by analysis of variance ($P \leq 0.05$).

Recipe

Amaranth, the entire plant is a tasty delicacy found in many dishes, making it quite a versatile medicinal vegetable, and consumed in a variety of ways,^[20,21,23,24,34,43] like curry preparation; young fresh leaves should be cut and added to stews, soups, and made into a curry and the seeds can also be sprouted, roasted, and used to flavor rice or mixed with honey to form cakes.^[20] Amaranth also has clusters of nutty edible seeds, which can be eaten as snacks or used in biscuits and porridge can be made by boiling the seeds in water.^[75] Grilled peach and papaya salad with Amaranth Granola, Amaranth Tikkis, Amaranth Chocolate Ravioli, Amaranth Cupcakes, Amaranth Flour, Carrot and Raisin Cookies, Amaranthus Granola with Lemon Yogurt, Berries and Marigold, Gluten-Free Amaranth Tabbouleh, Ramdana Ki Chikki, and Almond and Amaranth Ladoo are the healthy recipes of amaranth and easily add them to our diet to stay healthy and active.^[76]

Health sciences and technology communication food security economy

The activity of NGO named “Burdwan green haunter, students, researchers, regulators, teachers, staff, community, photographers, visitors, different scientist, academicians, clinicians, administrators, institutions, farmers, and students’ Goal,” and media personnel, campaign or aware or make the news or publication regarding the importance of “COVID-19 Cost-Effective Social Vaccine Develop from Potential Amaranth Biomedicine: Improving Immunity Healthcare Medical Sciences and Technology Communication Food Security Green Economy Applications, and Nutritious foods, Healthcare, Defense response and Immunity as well as Biodiversity Conservation Issues,” in different audiovisual media (TV channels), social media, web pages, newspapers, and journals, are recorded. It is a platform to promote and discuss different new issues and developments by publishing case reports in all aspects of clinical medicine for all over the globe.^[35,36,41-70,77-81]

RESULTS

RK and mosaic foliar disease

Table 1 shows the use of amaranth as a “Susceptible Catch Vegetable Crop Biomedicine Plants,” against naturally pathogens infected diseases; RK, AMV, OYVMV, ALCV, and OELCV, in a well-protected garden intercropped with okra plants by analysis of variance ($P \leq 0.05$), though both the amaranth and okra plants were susceptible to RK nematodes and foliar diseases. Here, amaranth was more susceptible than okra in terms of root-gall number nematode population in root and root protein content forming “Potential Eco Friendly Highly Economical Biomedicines Catch Vegetable Crop Plants.” In the inoculated amaranth okra intercropped field, amaranth and okra show the highest infection, respectively, in terms of the average number of leaves/plant, the average number of disease (AMV, OYVMV, ALCV, and OELCV) infected leaves/plant (%), the average number of root galls/plant, the average number of nematodes (RK)/2 g of root and 200 g soil, average biomass (g) of fresh weight of root, and average protein % of root protein content, but increased average biomass (g) or fresh weight of shoot and average protein % of fruit protein content, in comparison to other plots. While RK population increased significantly in 65 days in the weed-amaranth showing the highest intensity of nematode infection [Table 1].

Suggestions in future research

The results confirms the goal as a proposal for future research and to present the practical ways in which the proposed study should be conducted by the future researcher for conducting the research consistent with requirements of the professional or academic field and a statement on anticipated outcomes and or benefits derived from the study’s completion.

Food security in health care

The students, researchers, teachers, staff, community, photographers, visitors, different scientist, administrators, institutions, farmers,

Table 1: The weed amaranth intercropped with okra infected with RK, AMV, OYVMV, ALCV, and OELCV diseases

Plots	Average number of infected leaves/plant (%)		Average number of root galls/plant	Average number of nematodes (populations)		Average biomass (g)		Average protein %	
	AMV/OYVMV	ALCV/OELCV		Soil (200 g)	Root (2 g)	Shoot	Root	Root	Fruits
I. Uninoculated amaranth okra	22.08 ^a ±2.042	8.09 ^a ±0.87	Nil	Nil	198.50 ^a ±2.02	43.00 ^a ±1.15	2.97 ^a ±0.01	Nil	Nil
II. Inoculated amaranth okra	72.20 ^b ±2.12	32.42 ^b ±0.42	Nil	Nil	91.10 ^a ±1.02	12.00 ^a ±0.10	4.01 ^a ±0.01	2.99 ^a ±0.13	Nil
III. Inoculated amaranth	23.17 ^a ±1.03	9.02 ^a ±0.78	3987.58 ^a ±22.03	108.98 ^a ±2.42	1499.98 ^a ±12.22	59.80 ^b ±1.99	6.58 ^b ±0.02	1.98 ^b ±0.02	Nil
IV. Inoculated okra	38.03 ^b ±0.52	11.06 ^b ±0.11	12.05 ^b ±10.14	108.98 ^a ±2.42	53.75 ^b ±11.33	14.30 ^b ±0.16	4.29 ^b ±0.03	1.98 ^b ±0.02	Nil
	48.03 ^b ±1.71	18.83 ^b ±1.09	4929.43 ^b ±29.21	28.06 ^b ±1.04	1968.75 ^b ±10.15	63.95 ^b ±1.19	6.27 ^b ±0.03	1.07 ^b ±0.01	Nil
	85.06 ^c ±0.11	54.04 ^c ±0.12	1697.20 ^b ±5.20	36.75 ^b ±1.93	873.00 ^b ±10.01	34.75 ^b ±1.53	5.69 ^b ±0.02	1.07 ^b ±0.01	Nil

^{a,b,c}Significant difference in a column by analysis of variance (P≤0.05). RK: Root knot, AMV: Amaranth mosaic virus, OYVMV: Okra yellow vein mosaic virus, ALCV: Amaranth leaf curl virus, OELCV: Okra enation leaf curl virus

NGOs, and media personnel campaign OR aware, OR discuss OR arrange workshops and seminars, OR make news regarding the importance of “COVID-19 Cost-Effective Social-Vaccine Develop from Potential Amaranth-Biomedicine: Improved Immunity Healthcare-Medical Sciences and Technology Communication Food-Security Green-Economy with Applications, and Nutritious foods-, Defense response as well as Biodiversity Conservation-Issues”, and publish it as abstract OR paper in different national- and local- audiovisual media (TV channels), different social media, web pages, newspapers, and different -national and -international Journals as well as Congress Proceedings also.

DISCUSSION

Common thread healthy diet prevention COVID-19

The cost-effective fresh weed vegetables, the amaranth, qualify as an ideal food source for people of low-income food deficit countries, and the entire plant is used as vaccine and provide food and immunity “Aid to Eating and Staying Healthy during COVID-19.”^[20,21,82] And for easy understanding, various different subheadings highlight the many points to deepen and link them to a unidirectional common thread “COVID-19 Cost-effective Social Vaccine Develop from Potential Amaranth Biomedicine: Improving Healthcare Medical Sciences and Technology Communication” that to make the reader easily understand the link between the various considerations.

Advantages of amaranth as biomedicine

Susceptibility

It is evident from the observation that amaranth and okra plants were highly susceptible to RK, AMV, OYVMV, ALCV, and OELCV disease, but less infected in the intercropped with amaranth okra plants, in the intercropped plot, in comparison to inoculated naturally infected plots. Although, both the amaranth and okra are very good hosts of these nematodes as well as foliar pathogens.^[80-83] However, RK nematodes liked to feed on amaranth

rather than okra when it had a choice, forming the “Susceptible Catch Vegetable Crop Biomedicine Plants.” It is due to the relative size as well as biomass of the two root systems that are responsible for the difference in susceptibility between the two plant species. Here, the amaranth root system colonizes and occupies the large area, it is likely that the plant parasitic nematodes will preferably be found in its roots^[64-70] and due to susceptibility of amaranth.

Defense resistance

Moreover, the positive effects of the growth of both amaranth and okra plants may be responsible for defense resistance against other plant pathogens.^[35-36,41-70] The farmers would be benefited double; by controlling RK diseases and by buying and selling the amaranth okra fruits.^[64-70]

High tolerance to environmental stresses

The influence of environmental factors for the germination response of amaranth to temperature, solution pH, moisture stress, and depth of emergence was evaluated under controlled environmental conditions.^[84] Amaranth has high relative productivity, production stability, and high tolerance to environmental stresses such as physiological and biochemical toxicity of hexavalent chromium (Cr [VI]) stress,^[85] drought, and nickel phytoaccumulation potential of *A. viridis* impact on selected morphological parameters such as total biomass, plant height, root length, and number of leaves.^[86] Intercropping systems indicated the advantage of these technologies and their function of socioeconomic and biophysical conditions, the mechanisms and processes associated with soil fertility management, the effect of intensive agriculture on soil degradation, the role of traditional and scientific knowledge, benefits, challenges, and additional human use impacts on long-term ecological composition and function.^[87] The genotypes and environmental stress of amaranth, use as dual crop for leafy greens and seeds with stable responses to leaf harvest.^[88] Salinity is a major environmental stress that limits crop production and growth plans as well as its

physiological processes such as photosynthesis rate and stomatal conductance worldwide^[89] and drought also influences ion accumulation and antioxidative enzymes in genotypes^[90] with phosphor-proteomic response.^[91]

Climate change and food security in agriculture

Plants growth directly rate by increasing photosynthesis and stomata activity conserves solar energy in the glucose and significantly reduces CO₂ in the climate. Hence, 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.^[35-36,41-70] These results may suggest that plant diseases (such as nematodes, fungus, viruses, bacteria, and insects) might be effectively controlled by the amaranth plant as a “cover vegetables crop.” It is a new and more efficient solution, technologies, and products and it has to fulfill its food and nutrition requirement^[92,93] for controlling RK disease using amaranth intercropped with okra plants.^[35-70,72,74]

Consumption and digestion for prevention epidemiological diseases

Amaranth is the oldest widely cultivated, nutritional source of power used throughout history for both medicinal and culinary oligo purpose, used as traditional medicine, the cost-effective fresh vegetables, qualify as an ideal food source for people of low-income food deficit countries, and also has economic viability, low environmental impact and contributes to the conservation of natural resources and the sustainability of production systems and it is a safe food, easily available in all regions, low priced, seed, oil, and leaf are used as food, the amaranth plants (*A. viridis* L. cv. CO-1), “Aid to Eating and Staying Healthy during COVID-19,” to provide food and immunity, entire plant is 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 the WHO develops a blueprint for

diagnostics, vaccines, and therapeutics against novel coronavirus,^[19-21,82] forming the “Nature’s gift to the poor human disease-free healthy life” multipurpose crop,^[23,24,94,95] 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, which is essential for human nutrition that is responsible for the health benefits and it is not only healthy and delicious food but also it is highly versatile and easy to enjoy in a variety of recipes and makes them easier to digest. *A. viridis* have several active constituents such as tannins, resins, reducing sugars, and amino acids. The methanolic leaves extract was reported for the presence of rutin and quercetin.^[82] It also possess spinosterol (24-ethyl-22-dehydrolathosterol) as a major component along with 24-methyl-22-dehydrolathosterol, 24-ethyl-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). Moreover, mature fruit and stems contain crude fiber, used in the paper industry, and the mucilage of roots and stems is used in the sugarcane industry of India achieved first in the world. Amaranth is also known for several potential pharmacological properties health beneficial effects on human diseases, such as cardiovascular disease, Type 2 diabetes, kidney diseases, skin infection, digestive diseases, some cancers, antibacterial, antioxidant, nootropic, eye, body immunity, blood pressure, obesity, asthma, constipation, heart disease, osteoporosis, gastrointestinal health, sexual health, and neurological disorders,^[24-31,34-36,64-70,75,80-86,92,94-97] because phytochemical-based nutria pharmaceutical properties and emphasizes the clinical utility of the plant in various chronic diseases, a biological effects of major bioactive ingredients present in crude extracts of specific bioparts of amaranth.^[92,96-97]

Genetic improvements

Among the diverse wild gene pool of amaranth, it holds the resistant source of gene for many biotic

stresses, diseases, and pests infestation, and breeding approach is one of the gene transfers, and also on germplasm regeneration, genetic studies, and efforts on genetic for nutritional and economic potential, and population genetic structure in glyphosate-resistant and -susceptible amaranth populations using genotyping by sequencing.^[38,98-101]

Development of suggestions amaranth as biomedicine vaccine against COVID-19

Genome biology

We’re not completely human, at least when it comes to the genetic material inside our cells. We all may harbor, as many as, 145 genes which have jumped from bacteria, other unicellular organisms, and viruses and made themselves at home in the human genome in “Genome Biology” from bacteria, archaea, fungi, other microorganisms, and plants to animals. In the case of humans found one hundred forty-five genes jump from simpler organisms.^[102] The genomics of plant and animal is underpinning all organisms.^[103] Approximately 10% of the human genome is made of bits of virus DNA. Mostly, this viral DNA is not always harmful. In some cases, researchers have found that actually it has a beneficial impact. When viruses infect us, they can embed small chunks of their genetic material in our DNA.^[103] Human endogenous retroviruses (HERVs) are by far the most common virus-derived sequences in the human genome and mobile DNA shows a mechanism that has introduced more interindividual variation in HERV content between humans than previously appreciated.^[104] Ben L. Calif informs, “The human genome is full of viruses and your body requires viruses, but viruses don’t always require a body.”^[105]

Genetic and immune resistance mechanisms

It is reported in a chapter entitled “Genetic Resistance to Coronavirus Infection – A Review” where researchers have organized their review of genetic resistance to coronaviruses according to those three host resistance mechanisms: Genetic control at the level of the, cellular receptors, macrophage, and acquired immunity. Furthermore, they have included a general outline of the

methods used to identify host resistance genes in mouse models of infection.^[15] SARS-CoV-2 is the etiological agent responsible for the pandemic COVID-19 outbreak and the main protease (Mpro) of SARS-CoV-2 is a key enzyme that plays an important role in helping in viral replication and transcription which is the structure-based design of antiviral drug candidates targeting the SARS-CoV-2 Mpro.^[106] With this blueprint, the body effectively remembers the germ enabling a person to fight for reinfection by the same or similar viruses.^[107]

Decreasing, the chemicals' usage

The fertilizers pesticides, plus improvements in the crop input use efficiency, could minimize greenhouse gas emissions while protecting the environment. Sustainable agriculture holds promise for humankind and the planet earth, and it can be successful if all developed and developing nations stand together to seek “our common future” to produce more food while generating less environmental pressure.^[101]

Traditional medicine

The evolution of human history shows the evidences that people are using traditional medicine for therapeutic purposes. The reports from the WHO claim that 70–80% of population is primarily dependent on animals and plant-based medicines because of limited or no access to medical services. The drugs obtained from wild plants and animals are not only used as traditional medicines but also as raw materials in the formulation of modern allopathic and herbal preparations.^[9,15,19,20,25-31,34,108] It is reported that as an internal treatment, the innate response of the patient's immune system to the presence, and current antimicrobial peptides that could be used as potential therapeutic agents against microorganisms located in the skin and related to acne disease.^[109] The WHO, Africa welcomes innovations around the world including repurposing drugs, traditional medicines, and developing new therapies in the search for potential treatments for COVID-19 and the people of Africa deserve to use medicines tested to the same standards as people in the rest of the world and the therapies

are derived from traditional practice and natural, establishing their efficacy and safety through rigorous clinical trials is critical^[110] and COVID-19 vaccine develops using new, fast-growing native “Plant-based Technology.”^[34,48,49,69,70,111-113]

Human immunomics initiative (HII)

Vaccination has four components for successful implementations; knowing the vaccine target, what kind of immune response, how to generate that response, and understanding responses in the people who we want to vaccinate. HII aims to decode the underlying mechanisms and advances in computing and artificial intelligence (AI), genomics, systems biology, and bioinformatics.^[114] And everybody should follow the guideline of WHO-“Vaccine-preventable diseases and vaccines”.^[115] It is reported that long-stay stress in emergencies can be responsible for this condition in a case study of Tako-Tsubo cardiomyopathy disease to reduce wait time in the emergency as much as possible.^[116] Harmonized clinical trials are aimed to accelerate licensure and distribution by the public-private partnership and platform.^[117] Because recently, it is known that without effective control measures, strong outbreaks are likely in more humid climates, and summer weather will not substantially limit pandemic growth.^[118]

Nature of binding

SARS-CoV-2, the coronavirus that causes COVID-19, enters human cells by binding of its viral spike protein to the membrane bound form of them aminopeptidase angiotensin-converting enzyme 2 (ACE-2).^[15,16,119] Studies in animals have suggested that ACE inhibitors and angiotensin receptor blockers (ARBs) may upregulate ACE2 expression,^[120] thus increasing the availability of target molecules for SARS-CoV-2. Ultimately, one or more randomized trials will be needed to answer definitively the question of whether ACE inhibitors or ARBs pose harm to patients with COVID-19.^[121] The T cells – immune warriors help us fight against COVID-19, have been unclear and the two studies disclose infected people harbor T-cells that target the virus and may help them recover and both studies also found some people never infected

with SARS-CoV-2 have these cellular defenses, most likely because they were previously infected with other coronaviruses,^[122] by “Antibody Testing for COVID-19”^[123] by which designer antibodies could battle.^[124]

Epitopes

It is reported that a panel of seven murine monoclonal antibodies was raised against particles of okra leaf curl virus, and serological relationships and epitope profiles of isolates of okra leaf curl geminivirus,^[125] which causes the same disease in cassava or tomato in different continents have different epitope profiles but occur in the same geographical area show a general similarity in epitope profile^[126] with little diversity^[127] and these chimeric virus particles could constitute a cost effective and safe alternative to live replicating virus and bacterial vaccines which have now been generated and their immunogenicity examined in a number of animal species.^[128] In a chapter, it is reported the ability of African medicinal spices and vegetables to tackle malignant diseases. The likely mode of action of reported extracts and compounds included induction of apoptosis, coupled to cell cycle arrest either in G0/G1 or between G0/G1 and S-phases in cancer cells, disruption of the mitochondrial membrane potential, generation of reactive oxygen species, as well as activation of caspases enzymes.^[129] It is proved to exert various health favorable effects, including blood cholesterol reduction in animal models by cowpea seed β -lignin, a vicilin-like globulin which showed: Differing glycosylation patterns of the property observed only in few other legume seed visions.^[130]

Viral nanobiotechnology

It is an emerging and fascinating field, dealing with the use of virus-based nanoparticles (VPNs) as templates and/or building blocks to display novel molecular moieties with specific properties for science. Plant virus-based nanoparticles (VPNs-VNPs and VLPs derived from plant viruses) have been explored for several years either to express subunit vaccines or as epitope presentation systems, and the high degree of symmetry,

polyvalency, monodispersity, non-infectious, and non-hazardous nature when injected to mammals, low cost of production, and biocompatibility. VNPs and VLPs can readily be engineered chemically, and it has been developed for imaging, drug delivery, and therapeutic applications.^[131]

Coronavirus dashboard

Scientists say that novel coronavirus has originated naturally^[132] forming a global crisis.^[133] Hence, it has to need recipes for potential COVID-19 drugs; by “Modeling of Coronavirus Infection”^[134] and “WHO Timeline and Dashboard Updated”^[135,136] and using AI software for disease (COVID-19), because the new methods use cheap, readily available starting materials, licensed drug suppliers could quickly ramp up production of any promising therapies^[137] and the global collaboration to vaccines.^[138]

Emergency applicable suggestions amaranth as potential biomedicines

Conventional vaccines, though effective, have high production costs, involve tedious purification processes, and have biosafety issues, requiring time-consuming biosafety tests for commercial production, and the production of plant-based vaccines and antibodies.^[139] Now, the results and discussion fulfill the goal for the research suggestions because the present study needs to justify future research and to present the practical methods in which the proposed study should be conducted or suggestions.

Suggestion-I

In biomedicines, the plant virus, AMV and ALCV, may be used in vaccine formulations to regulate immune function against coronavirus, which has been developed as antigenic epitopes derived from the vaccine targets COVID-19.^[69,70,130,131,139,140] These plant virus-based nanoparticles are attracting, and clinicians for imaging, drug delivery, and therapeutic applications.^[141] When the latter is used, it involves mostly the users just like any conventional vaccination which administers the antigen in an inactive state to gain

immunity toward the disease and is given before the onset of disease or disease symptoms in an individual as a prevention rather than cure.^[142] It is obligatory that information on ClinicalTrials.gov, a resource provided by the U.S. National Library of Medicine (NLM), to the National Institutes of Health (NIH) or other agencies of the U.S. Federal Government, is provided by study sponsors and investigators, and they are responsible for ensuring that the studies follow all applicable laws and regulations.^[114,143,144] It is also studied, the cost-effectiveness of emergency care interventions, in low- and middle-income countries like India.^[145] However, it will not only be cost effective but also easily available and preparable, higher yields, stability and safety, as well as safe alternatives to live replicating COVID-19 vaccines.^[134-139]

Suggestion-II

The amaranth (fresh or cooked) may be consumed as biomedicines at 100 g (one cup) twice daily (during taking meal) for at least 6 weeks, against naturally occurring coronavirus infections 45 days before the symptom onset OR illness onset (as a vaccine) OR onset of symptoms (if possible) associated COVID-19 infections have been reported (treatments).^[75,80-88,92,95-99,146] The edible biomedicine okra may also be directly personal used for “Clinical trial or as a Vaccine” after getting permission from the WHO, clinicaltrials.gov., U.S. NLM and NIH.^[114,143,144] It is the most cost-effective, easily available, safe edible, and easily preparable as well as safe alternative to live replicating COVID-19 vaccines.^[48,49,69,70,134-139,145]

Planned to publish suggestions

The current outcomes of the therapies on coronavirus disease (COVID-19) outbreak that helps the readers as well as a scientific community to take measures or treatment opportunities or discoveries of vaccines to avoid new coronavirus reinfections. Our main goal is to limit infections. Let us all take this basic information’s as proposal and also educate people, help them to fight against this war, the normal life of everyone is on hold due

to this escalating coronavirus emergency, which in a way helps all the scientist, readers, authors, and editors to take necessary and respective steps to save or avoid this dangerous disease. It is requested all to support this initiative and help to reach the targeted audience. Moreover, it also focuses the future “Innovative Journal of Medical Science Globally” which serves as an evidence-based resource covering various experimental disciplines of medicine, innovative case reports, and therapies in complementary medicine, integrative medicine, and traditional medicine or international journal of health care and medical sciences for “Effective and Simple Methods of Preventing the Transmission of Viral Diseases COVID-19.”^[1,9,147-152]

Suggestions for emergency applications

Amaranth-based healthy diet and greater prevention against COVID-19

Eating amaranth-based healthy diet with Vitamin D is very important during the COVID-19 pandemic because affect our body’s ability to prevent, fight, and recover from coronavirus infections by improving supporting immune systems which is reported in the “Genome Biology and Evolution,” these genetic changes may have sharpened the body’s defenses against the pathogens.^[1-26,69,70,94,95,145,152,153]

Amaranth-based vaccines offer several advantages

Conventional vaccines, though effective, have high production costs, involve tedious purification processes, and have biosafety issues, requiring time-consuming biosafety tests for commercial production. Plant-based vaccines and antibodies offer several advantages over the conventional systems such as ease of production, storage, higher yields, stability, and safety.^[4,19,48,110,116-118,122,139-140,141-156]

Emergency applications of vaccines and antiviral personalized drugs

There is a massive international effort underway to develop diagnostic reagents, vaccines, and antiviral drugs in a bid to slow 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,^[145,157] by

inducing a potent immune response through both humoral and cellular components of the immune system.^[18,19,158,159]

Emergency use as cost-effective personalized biomedicine social vaccine

Amaranth should be used as a potential emergency care cost-effective personalized biomedicine “Social Vaccine” because it resists and changes unhealthy pandemic social and economic structures and useful metaphor for health promotion,^[18,19,77,145,158-160] because ancient microbial arms race sharpened our immune system^[153] and the SARS-CoV-2 genome with other beta-coronaviruses can provide useful information on how drugs targeting other coronaviruses may improve outcomes for COVID-19 patients.^[161] Moreover, the WHO and other international organizations have set up a system to accelerate and equitably distribute vaccines, “the COVID-19 Vaccines Global Access Facility”^[1-12,162,163] for preventing any controversy and drug development is the urgency in the COVID-19 pandemic, with the “Biosimulation – using computers to simulate drug response in humans – can help accelerate the process, which creates hopes to achieve with a new platform launched today targeted at COVID-19 vaccine development.”^[164]

Future approach

It will be achieved from typical analysis or justifications of literature review, research articles, specifies hypotheses, backgrounds, problems, brief review of the key literature, reports of clinical research trials or fields, note of any relevant controversies or disagreements in the trials or field, important references and data or conclusions from the work, extensive discussion of relevant literature, as well as present investigation results. It emphasizes the new and important aspects of the experimental findings, and the conclusions that follow the usefulness to clarify the main findings, and then explore possible mechanisms and explanations for these findings, which compare and contrast-”How the research is different from previous reporting, and how the observations will significantly advancement of the current problem

or knowledge of the subject, with the state of the limitations of the study, and its emphasis on claiming priority of work that has not been completed. 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.^[25,34,69,70] In the future, combined “Amaranth-Okra” may not only be “Potential Economical Crop” against various pathogens in agriculture but also “Potential Cost-Effective Green Economical Social Vaccine Biomedicine against COVID-19 with Safe and Elicits Significant Immune Responses,” and it resists and change unhealthy pandemic social and economic structures.^[69,70,77,159-163]

CONCLUSION

The amaranth could serve as a good “Eco-Friendly Potential Biomedicines Highly Economical Catch Vegetable Crop Plants,” conserving “Biodiversity Conservations Sustainable Climate Health and Development with Important Socioeconomic Implications in Agriculture” and “Healthy Amaranth Diet Greater Prevention against COVID-19.” It has important economic implications in agriculture to fulfill its food and nutrition requirements and improved midday meals by preventing malnutrition. Moreover, highly trace tolerance amaranth may be used, in vaccine formulations or treatments, as one of the most powerful potential biomedicine, improving natural immunity against COVID-19. It is the most powerful cost-effective emergency health care easily available safe edible preparable easy applicable future potential personalized biomedicine as vaccines and safe alternative to live replicating COVID-19 “Vaccines,” enriching food security green economy medical science and technology communication applications issues. Now, it is planned to publish as suggestions; the use of amaranth as biomedicines, and okra as future biomedicines, based healthy diet and greater prevention against SARS-CoV-2, by boosting our immune system, and acts as an indispensable source to access the pharmacological developments globally. Moreover, amaranth-based social biomedicine vaccines offer several advantages

over the conventional systems such as ease of production, storage, higher yields, stability and safety, and advantages in comparisons, prospects, and challenges or constraints in the production of plant-based vaccines and antibodies.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest. The idea was conceived by S. C. Datta.

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