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Physiology of Biomedicines Ecology Enriched Medical-Science- Agriculture-Technology-Communication Wildlife-Biodiversity-Conservation Socio-Economy-Issues

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Abstract: Agricultural-sector is the backbone of the economy, sustainable development, and food security, and provides health-livelihood hampered by different-pathogens-pest-attacks, and the recent pandemic-pathogens coronavirus-2 badly affects food sustainability and security; decreased incomes, socioeconomic impacts, short food-supply-chains, chronic and acute hunger, conflict, natural hazards, and climate-and-human-behavioral-change, and risk of other illnesses like black-fungus-infection also, though the roll-out of COVID-19 vaccines warrants a clear and shared international understanding of disease-control-pharmacogenomics, otherwise, it is likely to become a hotspot of future-mutations-outbreak. To overcome these situations, the high-diluted-combined-biomedicines (HDCBM); Nematode MT (NMT) and Aakashmoni MT (AMT) applied on okra-root-callus-and-plants, *Abelmoschus esculentus* (L.) Moench Cv. Ankur-40, reduced root-knot disease caused by the *Meloidogyne incognita* (Kofoid & White, Chitwood), reduced nematode-infestation not only in okra-root-callus-and-plants, but also improved the growth of callus-and-plants in all respects, especially biomass and number of fruits, and fruit-protein-content, and the number of new proteins in the root-callus also which is resolved by polyacrylamide-gel-electrophoresis and densitometer-scanning. The molecular weight of new-pathogenesis-related (PR)-proteins-gens (280kD to 11kD) in root-callus and nematode-proteins are more or less within the range of 'Coronavirus-Structural-Proteins', which might be responsible for defence-resistance against callus-or-plant diseases, and might be preventive as potential-combined-biomedicines against variant-coronavirus by improving natural immunity, and the mechanisms of pathogenesis can aid in the production of effective 'Anti-Coronavirus-Agents' OR 'Vaccine' OR 'Combined High-Diluted-Cheap-Eco-Friendly-Non-Toxic-Non-Pollutant-Emergency-Applicable Biomedicines' against "COVID-19, Root-Callus-and-Plant-Diseases" enriching "Food-Security Sustainability-Agriculture-Biodiversity Global-Climate-Health-Socio-Economy Science-Technology-Communication-Application-Issues". More research on immunomodulation-therapeutic strategies on the certain-mutant-variant-long-coronavirus-2 for the high mortality rate, transmission, and underpins, with the "Legal-Epidemiology" of pandemic-control is needed. It will be told "Physiology of Biomedicines Ecology Enriched Medical-Science- Agriculture-Technology-Communication Wildlife-Biodiversity-Conservation Socio-Economy-Issues" in the 'Happy New Year 2023' for the 'Human Civilization and Well Beings'.

Keywords: Physiology-Biomedicines-Ecology; Enriched; Medical-Science- Agriculture-Technology-Communication; Wildlife-Biodiversity-Conservation; Socio-Economy-Issues.

INTRODUCTION

In India like developing countries and the global agricultural sector is the backbone of the economy, sustainable development, food security, and provides health and livelihood with enriched environment-science-technology-communication-socioeconomic etc., which are hampered by the different pest attacks; the only locust outbreak causes crisis across 23 countries and other zoonotic diseases remain a recurrent threat, though the chemical pesticides are very much effective but remain various problems (Workie, *et al*., 2020; Josephson, *et al*., 2021; Stephens, *et al*., 2020; Cariappa, *et al*., 2021; The World Bank, 2021; Datta, 2019a,2019b,2019c,2019d,2019e; 2020a, 2020b, 2020c, 2020d, 2020e, 2020f, 2020g, 2020h, 2020i, 2020j, 2020k, 2020l, 2020m, 2020n, 2020o, 2020p, 2021a, 2021b, 2021c, 2021d, 2021e, 2021f, 2021g, 2021h, 2021i, 2021j, 2021k, 2021l, 2021m, 2021n, 2021o, 2021p, 2021q, 2021r, 2021s,2021t, 2021u, 2021v, 2021w, 2022a;2023a,2023b,2023c; Sukul, 1970, 1992; Sukul, *et al*., 2001). Recently, scientists reported that the pesticides block functional first known gene transfer between plants to insects or animals which happen from a plant about 35 million years ago, and whitefly hijacks a plant detoxification gene that neutralizes plant toxins, and whitefly uses a stolen plant gene to elude its host's defenses may offer a route to new pest-control strategies also (Ledford, 2021; Jixing, *et al*., 2021).

On the other hand, the recent 21st century-pandemic pathogens, the acute life threatening severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, previously 2019-nCoV), causing the Coronavirus-Disease-19 (COVID-19) are in the whole world already under intense strain, and the link between COVID-19 and conflicts are a deadly combination; badly impacts globally on food sustainability and security leaving millions of children at risk, disasters, and climate change, nutrition crisis, decreased incomes, production, agricultural marketing, and consumption, labor and

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logistical constraints, and increased prices of food commodities affecting the consumption pattern, food insecurity and an inability to access medicine and staple foods, poverty and weak essential services, earning opportunities have dried up, health services have been stretched to the limits and travel restrictions have compromised access to markets, humanitarian crisis, recurrent armed conflict, acute malnutrition and major epidemic outbreaks, including the COVID-19 pandemic, threat of and the policy response, inter-group conflict worldwide, violent conflict, civil demonstrations, critical heterogeneity, and facing "a complex peace and security environment", long-standing inequalities,and the climate disruption, face the possibility of an uneven recovery, and the crisis is feeding many of these drivers of conflict and instability", chronic violence, re-emergence of old conflicts, slowed economic growth, severe impact on young people, increased risks, and the loss of opportunities for education, employment, and income, marginalization, mental health, criminals and extremists activities, gender inequalities in all areas of socioeconomic impacts in low-income countries, and political life, vaccines shortage, and conflict affected regions in the second wave, and changing of human behavior with variants struggle with global blind spots, and black fungus infection, and facing legal threat after challenging COVID-19 drug researcher (UNICEF, 2021; Bloem and Salemi, 2021; UN, 2021; Sserwanja, *et al*., 2021; The World Bank, 2021; Josephson, *et al*., 2021; Aschwanden, 2021; Wadman, 2021; Watts, 2021; Jeong, 2021; O'Grady, 2021).

Now, the whole world is preparing for future outbreaks or threats; "One Health" approaches for food security and the "Legal-Epidemiology" of pandemic control of COVID-19, is needed (Mardones, *et al*., 2020; Burris, *et al*., 2021), and they are providing food for sustainable development, agricultural water management, and designing a suitable cropping pattern for farmers (Valipour, 2015a, 2015b), but it cannot solve both the pandemic problems, though pandemic lockdowns affected our immune systems (Ellis, 2021), and further research to support policies towards ensuring affordable healthy diets that include sustainability considerations (FAO, *et al*., 2020). It is noticed that legume seeds for agricultural intervention to improve human nutrition, household food insecurity improved, anthropometric measures, children's diet was diversified, ecological and social benefits like the men became more involved in household tasks, and women's well-being improved and wanted rules for success in pandemic for the scope of data access to everyone (Ash,2021; Editorial, 2021).

Initially, it is thought that the use of different phytomedicine OR bio-agents OR crud plant extracts OR homeopathy OR intercropped-/multi cropped-biomedicines OR biomedicines-meal OR biomedicine-vaccine OR social-vaccine OR policy-developed global-vaccine OR different epidemic-models OR civil-engineering epidemic-model, etc., will fulfill all requirements for controlling plants and animal diseases. But sometimes it causes problems regarding the emergency application, availability, cost-effectiveness, limitations, restrictions, toxicity, and biodiversity-conservation, etc., also (Datta, 2019a, 2019b, 2019c, 2019d, 2019e, 2020a, 2020b, 2020c, 2020d, 2020e, 2020f, 2020g, 2020h, 2020i, 2020j, 2020k, 2020l, 2020m, 2020n, 2020o, 2020p,2021a, 2021b, 2021c, 2021d, 2021e, 2021f, 2021g, 2021h, 2021i, 2021j, 2021k, 2021l, 2021m, 2021n, 2021o, 2021p, 2021q, 2021r, 2021s,2021t, 2021u, 2021v, 2021w, 2022a;2023a,2023b,2023c; Sukul, 1970, 1992; Sukul, *et al*., 2001).

Recently it is seen that the use of animals-and –plants biomedicines against the both-pandemics pathogens, will be more effective than the previous one; new, and more efficient solutions, science and technology applications, and products improving agriculture by inducing natural defense response or natural immunity preventing viral pandemic (Datta, 2021j, 2021k, 2021m,2021p, 2021q,2021r,2021t,2021u, 2021v, 2021w).

The main aims and objectives of the present experiments are to find out the most effective, and further confirm, the combined effects of high-diluted biomedicines; animal-biomedicine-Nematode MT (NMT), and plant-biomedicines-Aakashmoni MT (AMT), which must reduce root-knot (RK) diseases of okra-root-callus (ORC) and okra plants (OP) by increasing defense response of host plants, and also confirm that both the extracts could reduce pandemic COVID-19 disease by

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boosting natural immunities. And try to find out the actual cause of natural defense responses OR natural immunities against pandemic pathogens with the help of polyacrylamide gel electrophoresis and densitometer-scanning of root callus proteins-genes and nematode proteins-gens, which may help to develops many vaccine ideas.

MATERIALS AND METHODS

1. Location of experiments

1.1. Okra root callus culture

The okra root callus culture (Plate 1)was conducted in the 'Tissue Culture Laboratory of the Department of Botany, Visva-Bharati University, Santiniketan-731235,West Bengal, India". The healthy seeds of okra, *Abelmoschus esculentus* (L.) Moench Cv. Ankur-40 was taken into a sterile vial, sterilizing the surface of seeds with 0.1% $HgCl_2$ (Mercury (II) chloride or mercuric chloride) for 5-10 minutes, and then the seeds were washed thoroughly at least 5-10 times with sterile double distilled water to remove the all traces of $HgCl_2$ in the laminar flow hood UV-chamber. Then the seeds were cultured on MS (Murashige & Skoog)-basal media (adjusted to pH 5.8 before autoclaving at 120°C for 20 min) in a glass tube (25 x 150 mm) for germination (Murashige and Skoog, 1962; Elele, 2012; Datta, 2021j, 2021k, 2021m, 2021p, 2021q, 2021p, 2021q, 2021r, 2021s,2021t, 2021u, 2021v, 2021w; Mukherjee, *et al*., 2020) in the tissue culture room, and the seeds were incubated at an optimum of 20±2°C and RH of 75%. All the cultured test tubes were sealed with a cotton plug. After 17 days, the root of the germinated seeds was excised and transferred to callusing MS-media (20 ml vol.) supplemented with 2,4-D (2 mg/1), maintaininga 16 h photoperiod (General Electric cool white tubes of 50 p Em-2S-2 at test tube level) in glass tubes at 20±2°C with 75% RH (relative humidity).The root callus formation starts from the tip of the roots within a week. After 15 days, callus growth was vigorous and color was white and transferred the entire callus into the freshly prepared same callusing MS-media for long culture (Alagumanian, *et al*., 2004; Elele, 2012; Datta, 2021j, 2021k, 2021m, 2021p, 2021q; Mukherjee, *et al*., 2020). The experiment was repeated thrice.

[Insert Plate 1 here]

Plate 1: An experimental view of root callus tissue culture laboratory and outdoor garden.

1.2. Okra pot culture

The experiment was conducted outdoors (Plate 1), in the garden of the Department of Zoology, VisvaBharati University, at an ambient atmospheric temperature (20 ± 5°C) and relative humidity (75±5%). The aseptically germinated seedsof the *Abelmoschus esculentus* (L.) Moench Cv. Ankur-40 was sown at the rate of one seed/pot (32 cm diam.) containing a mixture of clay soil and composted manure (2:1 v/v), and the soil-filled pots were treated with boiling water 5-10 times. The pots were divided into the following eight (8)-groups; each numbering ten- (10): (i) Uninoculated Untreated, (ii)Nematode MT (NMT)-Pretreated Uninoculated, (iii) Nematode MT (NMT)-Pretreated Inoculated, (iv) Inoculated Untreated, (v) Nematode MT (NMT)-Pretreated Inoculated Aakashmoni MT (AMT)-Post treated, (vi) Inoculated Nematode MT (NMT)-Post treated, (vii) Aakashmoni MT (AMT)-Pretreated Inoculated, and (viii) Inoculated Aakashmoni MT (AMT)-Post treated by foliar spray and soil drench. Except for the last group, all other treatments were followed by foliar spray (Sukul, 1970, 1992; Datta, 2020l, 2020p, 2021b, 2021j, 2021k, 2021m, 2021p, 2021q, 2021r, 2021s,2021t,2021u, 2021v, 2021w, 2022a;2023a,2023b,2023c).

2. Inoculations

2.1. In okra root callus tubes

The okra root callus, *A. esculentus*Cv. Ankur-40, were inoculated with *M. incognita*J_2-larvae @120±5J_2 /callus at Day-18, growing for 45 days from the date of inoculation (Elele, 2012; Datta, 2021j, 2021k, 2021m,2021p, 2021q,2021r,2021t,2021u, 2021v, 2021w). All inoculations were done in hygienic conditions (Plate 1).

2.2. In okra pots

The okra plants (Plate 1), *A. esculentus* Cv. Ankur-40,were inoculated at the 8-leaf stage (Day-12) with *M. incognita*, J_2-larvae @3586±55J2 /plants, growing for 85 days from the date of inoculation (Datta, 2020l, 2020p, 2021b, 2021j, 2021k, 2021m, 2021p, 2021q,).

3. Preparation of high-diluted biomedicines

3.1. Preparation of high-diluted Nematode MT (NMT)-biomedicines

M. incognita females were collected from the experimental garden, grown with okra plants, *A. esculentus* Cv. Ankur-40 and they were washed repeatedly with sterile double distilled water, homogenized in tissue homogenizer, and then extracted with 90% ethanol at room temperature (20±2°C) for 15 days and were filtered for collecting extract. Later, the ethanol from the

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extract was removed by evaporation at room temperature (20± 2°C). The nematode-extract (NE) was allowed to evaporate at room temperature and the residue was kept over anhydrous calcium chloride for dehydration. The crude residue was diluted in 90% ethanol at 1mg/ml concentration and was prepared animal-biomedicines, Nematode MT (NMT) (Original Solution or Crude Extract i.e. Mother Tincture) ((Datta, 2021j, 2021k,2021m,2021p,2021q,2021r,2021t,2021u, 2021v, 2021w; Datta and Mukherjee, 2021; Sukul, *et al*., 2001).

3.2. Preparation of high-diluted Aakashmoni MT (AMT)-biomedicines

The plant-biomedicines, Aakashmoni MT (AMT) (Original solution or crude extract i.e. Mother Tincture) were also prepared from the air-dried and powdered fruits of *Acacia auriculiformis* A. Cunn. by the more or less same procedure (Sukul, *et al*., 2001; Datta and Mukherjee, 2021; Datta, 2019a, 2020a, 2020b, 2020h, 2020j, 2020l, 2020n, 2020p, 2021b, 2021e, 2021f, 2021i, 2021m, 2021o, 2021p).

3.3. Preparation of ultra-high-diluted-biomedicines liquids

For the preparation of ultra-high-diluted-biomedicines liquid of both the drugs; the NMT and AMTwere diluted with 90% ethanol (1:100) proportionate in a round vial which was filled up to two-thirds of its space, tightly crocked, and the vials were given 10 powerful downward strokes of the arm for mechanical agitation (succession), forming the 1st centesimal potency named Nematode 1C and Aakashmoni 1C respectively. All the subsequent potencies were prepared by further diluting eachpotency with 90% ethanol in the same proportion (1:100) and the mixture was given 10 powerful downward strokes. In this way different potencies of both the drugs; Nematode 30C, Nematode 200C and Nematode 1000C, and Aakashmoni 30C, Aakashmoni 200C and Aakashmoni 1000C, were prepared respectively (Sukul, *et al*., 2001; Datta and Mukherjee, 2021; Datta, 2019a, 2020a, 2020b, 2020h, 2020j, 2020l, 2020n, 2020p, 2021b, 2021e, 2021f, 2021i, 2021m, 2021o, 2021p, 2021q,2021r,2021t,2021u, 2021v, 2021w).

3.4. Preparation of ultra-high-diluted-biomedicines globules

For the preparation of ultra-high-diluted-biomedicines non-medicated (90% ethanol soaked) and medicated-globules of both the drugs; the NMT and AMT potencies in liquid form can be kept in globules respectively, and a vial was filled up to two-thirds of its empty space with sucrose globules of a particular size, and add few drops of 90% ethanol were poured into the vial to just moisten all the globules, and then the vial was crocked and shaken so that all globules were uniformly moistened, and the cork was loosened and the vial was turned upside down to allow excess liquid to drain out. Then keeping the vial in the inverted position for 9-10 hours, the vial was turned upright, well crocked, and kept in a cool dry place away from light, and these dry globules were then kept in a vial to retain their properties for several years. In this process, the 90% ethanol-soaked non-medicated sucrose globules were prepared. The medicated globules were prepared in the same way for comparison to the preparation of medicated NMT and AMT globules which were prepared with the 90% ethanol media. And in this way different potencies of both the drugs soaked globules; Nematode 30C, Nematode 200C and Nematode 1000C, and Aakashmoni 30C, Aakashmoni 200C and Aakashmoni 1000C, were prepared respectively (Sukul, *et al*., 2001; Datta and Mukherjee, 2021; Datta, 1999, 2006a, 2010, 2019a, 2020a, 2020b, 2020h, 2020j, 2020l, 2020n, 2020p, 2021b, 2021e, 2021f, 2021i, 2021m, 2021o, 2021p,2021q,2021r,2021t,2021u, 2021v, 2021w).

3.5. Preparation of high-diluted-biomedicines-test and –control solutions

For the preparation of high-diluted-biomedicines liquid test-solution of both the drugs of the NMT and AMT were diluted (v/v) @ 1ml drug/20ml sterile distilled water (in the proportion of drug: water =1:20) respectively, and the high-diluted-biomedicines liquid control-solution of both the drugs were diluted (v/v) @ 1ml 90% ethanol/20ml sterile distilled water (in the proportion of drug: water =1:20) respectively, and the control solution was prepared for comparison to the preparation of test solutions, and stored at 4oC for treatments media (Sukul, *et al*., 2001; Datta and Mukherjee, 2021; Datta, 1999, 2006a, 2010, 2019a, 2020a, 2020b, 2020h, 2020j, 2020l, 2020n, 2020p, 2021b, 2021e, 2021f, 2021i, 2021m, 2021o, 2021p,2021q,2021r, 2021t, 2021u, 2021v, 2021w).

4. Toxicity test of high-diluted-biomedicines

Two sets of cavity blocks with 1 ml sterile distilled water containing 50 larvae (J2) of *M. incognita* were taken; one set was treated as control and the other was treated as a treatment setting. To assess

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the direct effect of high-diluted-biomedicines of NMT-and AMT-test solution, the water was removed by pipette from all the treatment sets, and immediately replaced by 1 ml of test solutions - high-diluted-biomedicines were added respectively. To examine the direct effect of the control solution, the control set was received 1 ml of control solution and recorded with every 30 minutes interval for a period of 12 hours exposure period at room temperature (20±2°C). This mortality test was replicated five times. It was noted that both the control (without high-diluted-biomedicines) and treatment (with high-diluted-biomedicines) set were received control solutions (without medicines), and this mortality test was replicated five times (Fenner, 1962; Sukul, *et al*., 2001; Datta and Mukherjee, 2021; Datta, 2019a, 2020a, 2020b, 2020h, 2020j, 2020l, 2020n, 2020p, 2021b, 2021e, 2021f, 2021i, 2021m, 2021o, 2021p, 2021q,2021r,2021t,2021u, 2021v, 2021w).

5. Treatments with high-diluted-biomedicines test-and control-solutions

5.1. On okra root callus tubes

The high-diluted-biomedicines of NMT- and AMT -test solutions were applied into the okra root-callus and media of culture tubes at the rate of 0.1 ml/treated root callus tube three days before for pretreatments, and three days after inoculation with nematodes-J_2 for posttreatment (Pre-and Post-inoculation treatments) respectively. Control tubes were treated with an equal amount (0.1 ml) of control solutions prepared with sterile distilled water. All treatments were done in hygienic conditions (Datta, 2020l, 2020p, 2021b, 2021j, 2021k, 2021m, 2021p, 2021q,2021r,2021t,2021u, 2021v, 2021w). All the data were analyzed by ANOVA (Analysis of Variance). The experiment was repeated thrice. Data from the third experiment are reported here.

5.2. On okra pots

The high-diluted-biomedicines of NMT- and AMT -test solutions were applied into the okra plants and sprayed on plants @ 20ml/treated plants three days before for pretreatments, and three days after inoculation with nematodes -J_2 for posttreatment (Pre-and Post-inoculation treatments) respectively. Control okra plants were treated with an equal amount (20 ml) of control solutions prepared with sterile distilled water. In the last treatment group, each plant received 40 ml of test biomedicine test solutions; 20 ml from foliar spray, and 20 ml from soil drench. Pre- and post-inoculation treatments were given three days before and threedays after inoculation with J_2-nematode larvae, and the plants were regularly watered in the morning and evening. During spraying, the soil surface underneath each plant was covered with a polythene sheet. Plants in both uninoculated untreated and inoculated untreated groups received a spray of an equal amount of control solutions. All treatments were done in hygienic conditions (Lowary, *et al*.,1951; Chatterjee and Sukul, 1981; Datta, 2020l, 2020p, 2021b, 2021j, 2021k, 2021m, 2021p, 2021q, 2021q,2021r,2021t,2021u, 2021v,2021w). All the data were analyzed by ANOVA (Analysis of Variance). The experiment was repeated thrice. Data from the third experiment are reported here.

6. Harvesting

6.1. Okra root callus

All the okra root callus were taken out 45-days after inoculation and the following parameters were observed: biomass of root callus, number of juveniles in callus and media, number of mature females in callus, and estimation of protein in root callus and nematodes-female (Lowary, *et al*., 1951; Chatterjee and Sukul, 1981; Elele, 2012; Datta, 1999, 2020l, 2020p, 2021b, 2021j, 2021k, 2021m, 2021p, 2021q). All the data were analyzed by ANOVA. The experiment was repeated thrice. Data from the third experiment are reported here (Plate 1).

6.2. Preparation of okra root callus- and nematode-female- proteins

Fresh okra roots callus (ORC) of the eight treatment groups and *M. incognita* nematode-females (NF) were collected at random respectively, and then the pieces callus and females were homogenized with double sterile distilled water using mortar and pestle followed by glass tube homogenizer in hygienic condition respectively, and the extracts were then centrifuged at 3,500 rpm for 15 minutes at 40C in Remi C-24 refrigerated centrifuge and the supernatants were collected (Lowry, *et al*., 1951; Chatterjee and Sukul, 1981; Sukul, 1992; Datta, 1999, 2020j, 2020l, 2020n, 2020p, 2021e). And all the proteins samples of ORC and nematode were transferred into lyophilized and then the powdery extract was stored (-200C) for protein separation (Laemmli, 1970; Lowry, *et al*., 1951; Chatterjee and Sukul, 1981; Sukul, 1992; Datta, 2020j, 2020l, 2020n, 2020p, 2021e,2021i,2021j,2021l,2021q,2021r,2021t,2021u, 2021v, 2021w).

6.3. Densitometer scanning of okra root callus- and nematode-female- proteins

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The ORC- and NF-proteins separation was carried out by the method of Laemmli (1970) with the modifications as suggested by the LKB Instructional Manual (1986). A 10% separating gel and 5% stacking gel were used. The bands were scanned with a recording electrophoretic scanner (Biomidi, 96-300 densitometers). In Figure 2 and Table 2, the observation was recorded from the densitometer curve (Laemmli, 1970; Datta, 2020a, 2020b, 2020j).

6.4. Okra plants

All the plants were harvested or uprooted 85 days after the sowing of germinated seeds (Plate 1) and the following parameters in all the eight groups of plants were recorded: biomass of shoot, root and fruits, number of root galls/plant, nematode population/2g root and 200g soil, number of fruits, root- and fruit-protein content percent. Nematodes were extracted from soil and root by the modified Biermannmethod. Roots were finely torn into pieces by a blender before nematode extraction, and the three samples of fruit and root pieces were taken at random from each treatment and the total protein fraction in each sample was estimated by the Folin-Phenol methods (Sukul, 1970, 1992; Lowary, *et al*., 1951; Chatterjee and Sukul, 1981; Datta, 2020l, 2020p, 2021b, 2021j, 2021k, 2021m, 2021p, 2021q,2021r,2021t,2021u, 2021v, 2021w). The experiment was repeated thrice with similar results. Data from the last experiment were presented and the data were analyzed by the analysis of variance (ANOVA).

7. Global food security sustainability science technology communication

The NGO-Burdwan Green Haunter and Students' Goal, farmers, administrators, institutions, students, communities, different scientist, academicians, clinicians, associations, teachers, staff, scholars, researchers, regulators, photographers, visitors, healthcare, media personnel, anddifferent club and social organizations, organize street cornering, workshops, seminars, agriculture fair, health camp, campaign, aware, make the news, and publish in different journals emphasis on "Potential combined high-diluted biomedicines against COVID-19 enriching food security sustainability agriculture biodiversity socio-economy science technology communication application issues by preventing root callus-and plant- diseases" (Sukul, *et al*., 2001; Datta and Mukherjee, 2021; Datta, 2019a,2020a, 2020b, 2020c, 2020d, 2020e, 2020f, 2020g, 2020h, 2020i, 2020j, 2020k, 2020l, 2020m, 2020n, 2020o, 2020p, 2020q, 2021a,2021b, 2021e, 2021f, 2021i, 2021m, 2021o,2021p,2021q,2021r,2021t,2021u, 2021v, 2021w).

8. Future Suggestions in Research

Different important publication, literature review, different research and review articles, latest news, typical analysis, scientific explanation with providential logic, hypothesis, and conclusions, help to encourage future research (Datta and Mukherjee, 2021; Datta, 2019a,2019b,2019c,2019d,2019e,2020a,2020b, 2020c, 2020d, 2020e, 2020f, 2020g,2020h, 2020i,2020j,2020k, 2020l, 2020m, 2020n, 2020o,2020p,2020q, 2021a, 2021b, 2021e,2021f, 2021i, 2021m, 2021o, 2021p,2021q, 2021q,2021r,2021t,2021u, 2021v, 2021w).

RESULTS

1. Okra root callus (ORC)

Table 1, shows the combined effects of high-diluted biomedicines; NMT, and AMT treatments on the okra root callus, and all data were analyzed by ANOVA. The okra root callus formation started within 5-7 days from the cut ends and the tip of the roots. After 15 days, vigorous white-colored callus growth occurred. The inoculated untreated-ORC was taken out and examined at forty-five days of inoculation, and the presence of a large number of the third stage of juveniles-J_3 and-NF was present in RC, but nil in the MS-culture media. All the inoculated pre-and post-treated-ORC turned off-white to light brown color and loose-friable in texture after 28 to 30 days of inoculation, and those turned dark brown after 38 to 43days. In ORC, the uninoculated and untreated RC and inoculated treated ones had significantly greater fresh biomass than inoculated untreated-ORC and were the highest biomass in NMT-pretreated uninoculated ones (Table 1). In all pre-and post-treated callus number of juveniles -J_2 and mature-NFs was significantly decreased compared to the inoculated untreated-ORC. Nematodes population rate significantly increased in the inoculated untreated callus but a decrease in inoculated pre-treated- and NMT-pretreated inoculated AMT-post-treated callus. The ratio of the initial and final population was higher in all pre-and post-treated callus than in inoculated untreated callus, and next was post-treated callus Juveniles in media were higher in number than those in callus of pre-treated tubes. In the case of post-treated tubes, callus showed more juveniles than the media. There were no juveniles present in the media in the case of inoculated untreated rot callus tubes. Pretreatment

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effects were better than the post-treatment effects in terms of nematode population in root callus and media except for NMT-pretreated inoculated AMT-post-treated one (Table 1), and in the inoculated untreated ORC was the highest protein content.

Table 1. Combined effects of high-diluted biomedicines; NMT and AMT treatments on the okra root callus[X]

Mean with S.E.[Y]					
Treatments Groups	**Fresh Biomass of Root Callus (g)**	**Number of Juveniles in**		**Number of Females in Callus**	**Callus Protein Content (%)**
		Root Callus (2g)	**Medium (20ml)**		
UninoculatedUntreated	3.05d[Z]±0.01	Nil	Nil	Nil	0.41e±0.01
NMT-Pretreated Uninoculated	4.07a ±0.03	Nil	Nil	Nil	0.37f±0.01
NMT-Pretreated Inoculated	3.86b ±0.04	03f ±0.01	187a ±0.01	18d±0.02	0.44d±0.02
InoculatedUntreated	1.73g ±0.01	165a±0.01	Nil	27a±0.03	1.26a±0.04
NMT-Pretreated Inoculated AMT-Posttreated	3.42c ±0.02	08e ±0.02	172b ±0.02	19d±0.03	0.41e±0.01
Inoculated NMT-Posttreated	1.85f ±0.01	21b ±0.01	52e ±0.02	25b±0.05	0.98b±0.04
AMT-Pretreated Inoculated	3.09d ±0.03	12d ±0.02	158c ±0.02	21c±0.01	0.45d±0.01
Inoculated AMT-Posttreated	2.95e ±0.03	18c ±0.02	63d ±0.01	17e±0.03	0.49c±0.03

Footnotes:
'X'- Okra root callus inoculated with *M. incognita* larvae @120±5J_2/callus at Day-18 and taken out after 45 days from the date of inoculation.
'Y'- Mean of 10 replicates with S.E.
'Z'- Means carrying same letters in a column not significantly different (P≤0.05) by analysis of variance (ANOVA)

2. Toxicity of high-diluted biomedicines
Both the high-diluted biomedicines; NMT and AMT had no direct toxic effect on nematode because no mortality occurs after a period of 12 hours exposure period at room temperature (20±2°C), and the treated callus did not show any toxic effect also.

3. Molecular weight of okra root callus and nematodes
3.1. In okra root callus
Table 2 and Figure 1; shows the molecular weight (kD) of okra root callus proteins for the combined treatment effects of high-diluted biomedicines; NMT and AMT treatments on *M. incognita* pathogens infected RK-disease of the ORC. An analysis of root proteins of all groups by electrophoresis and densitometer scanning of all the test ORCshows that all the high-diluted biomedicines; NMTand AMT-pretreatments resulted in an increased number of proteins in the RC than posttreatment and inoculated untreated RC-groups; the highest number of root callus proteins in the high-diluted biomedicines NMT-pretreated group is 24, and next highest number of the callus root protein is 23 in the pretreated-NMT inoculated RC-group, and 20 in the pretreated-NMT inoculated AMT- posttreatment group, and the lowest number of protein is 11 in the uninoculated untreated RC-treatment-group and the 15 in the inoculated untreated RCrespectively (Table 2 and Figure 2). The highest molecular weight of the ORCprotein is 280kD and the lowest molecular weight of the ORC protein is 11kD. The lowest number of the new pathogenesis-related protein (PR-proteins) is 4 in the uninoculated untreated okra root callus and the highest number of the new PR-proteins is 22 in the high-diluted biomedicines NMT-pretreatedORC-treatment-group and the 19 number is the next highest new PR-proteinsin the high-diluted biomedicines NMT-pretreated ORC-treatment-group

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respectively (Table 2 and Figure 2). Though, the PR-proteins of inoculated untreated- and – inoculated NMT-posttreatment, is14, and the same number of PR-proteins in both the NMT-pretreated inoculated AMT- posttreatment group and inoculated AMT- posttreatment ORC-treatment-group is 18 (Table 2 and Figure 1).

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Table 2. Combined effects of high-diluted biomedicines; NMT and AMT treatment on the ORC^{X}

Treatments Groups	Total number of protein	Molecular weight (kD) of pretreatment groups Serials number of protein																							Total number of PR-protein
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Uninoculated Untreated	11	280	260	240	210	155	115	105	85	70	45	13	-	-	-	-	-	-	-	-	-	-	-	-	-	**4**
NMT-Pretreated Uninoculated	24	280	240	220	197	175	155	135	120	115	95	90	75	67	62	52.5	45	37	32	**28**	**23**	**20**	**17**	**15**	**12**	**19**
NMT-Pretreated Inoculated	23	295	235	220	180	160	140	135	120	115	98	88	82	72	60	50	42	38	30	**25**	**21**	**19**	**16.5**	**12.5**	-	**22**
Inoculated Untreated	15	270	240	200	170	145	118	98	90	77	65	58	46	37	27	17	-	-	-	-	-	-	-	-	-	**14**
NM - Pretreated AMT-Posttreated	20	275	240	230	210	175	150	135	110	94	85	67	58	47	38	34	29	20	17	**14**	**11**	-	-	-	-	**18**
Inoculated NMT-Posttreated	16	260	210	150	135	120	110	95	80	72	60	50	37.5	28	23.5	16.5	11	-	-	-	-	-	-	-	-	**14**
AMT-Pretreated	19	240	197	175	160	145	120	92	72	65	52	35	31	28	26	23	22	17	12.5	**11**	-	-	-	-	-	**18**
AMT-Posttreated	18	280	255	230	195	170	150	140	125	92	72	52	46	38	29	20	15	13	12`	-	-	-	-	-	-	**16**
Nematode Protein	18	280	260	250	200	190	165	150	135	85	55	40	38	27	23	22	18	15	12	-	-	-	-	-	-	**16**

Footnotes:
'-'indicate no band and 'nematode protein' not included in the treatments group.

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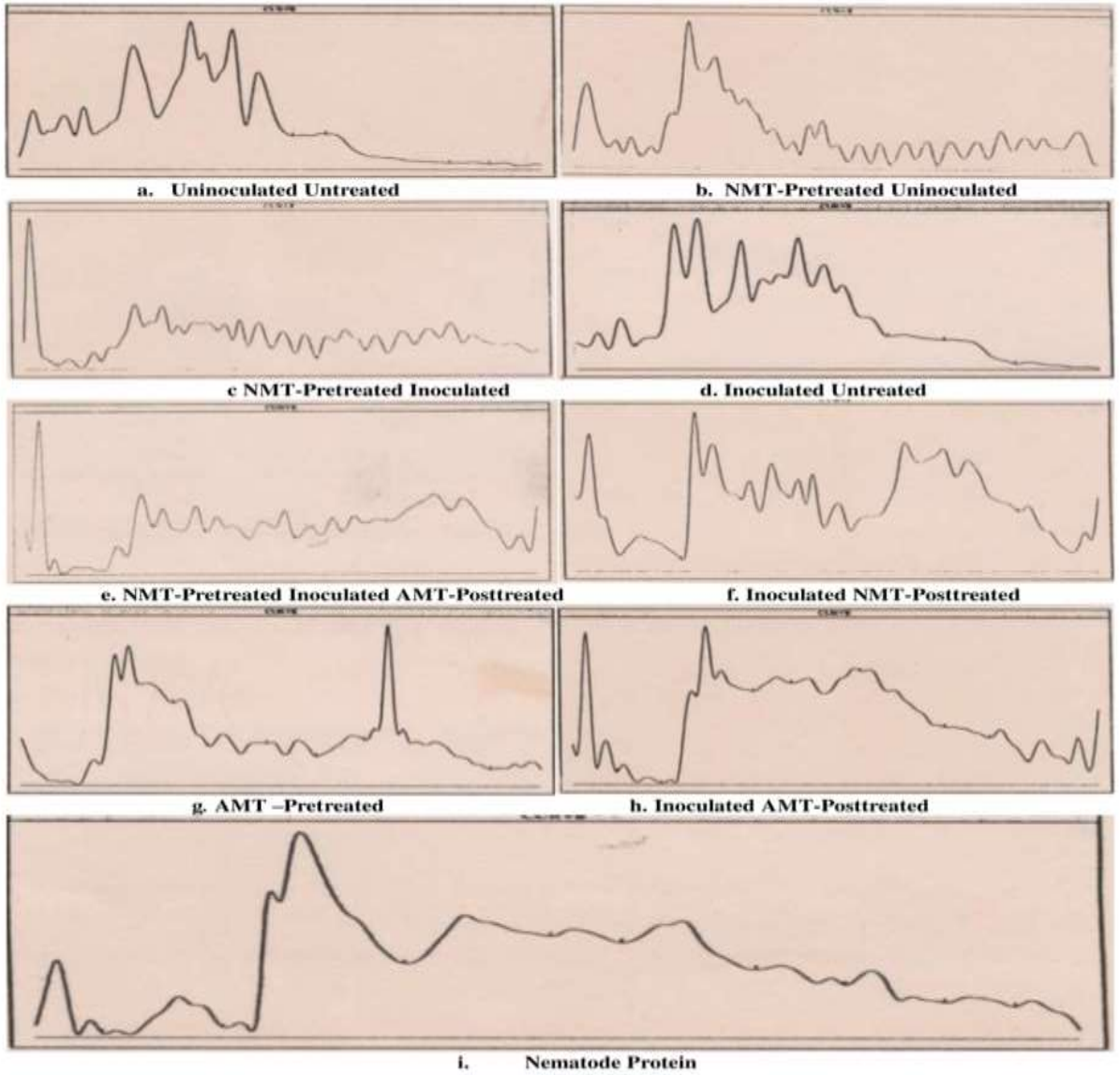

Figure 1 (a-i). Densitometry tracings of root proteins of okra root callus and nematode proteins resolved on acrylamide gel (SDS-PAGE).

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Plate 1- An experimental view of root callus tissue culture laboratory and outdoor garden

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3.2. In nematodes females (NF)

The high-diluted biomedicines-NMT prepared from nematode female (NF) of *M. incognita* which contained a total of eighteen proteins, and the molecular weight of the nematode proteins ranging from lowest 12kD to highest 280kD, and the total number of the PR-proteins of nematode female is 16 in comparison to the uninoculated untreated-group (Figure 1and Table 2).

4. Okra plants (OP)

Table 3, shows the results of combined effects of the high diluted biomedicines; NMT,and AMT-treatments on the OPs, and all data were analyzed by ANOVA. All the treatment groups of OP treated with high diluted biomedicines; NMT and AMT reduced nematode infestation in terms of root-gall (RG)-number and nematode population in root in comparison to inoculated untreated groups (Table 3). While high diluted biomedicines-NMT alone reduced RK-diseases infection of OR to a minimum, and the combined NMT and AMT came next in order of efficacy among all the treatments groups of OPs (Table 3). The population of nematode in rhizospheric soil was high with the group treated with combined high diluted biomedicines; NMT and AMT, and minimum with the inoculated untreated group (Table 3). Plant growth in terms of fresh biomass of shoot and fruits, and the number of fruits was higher than inoculated untreated groups in all the treatment groups of OPs treated with the high diluted biomedicines; NMT and AMT, and NMT-treated groups followed by the groups which were treated with NMT and AMT (Table 3). The root protein content percent of okra was the highest in the inoculated untreated group. But the fruit protein content percent was the maximum in all the groups treated with the high diluted biomedicines; NMT and AMT, and also in the groups which were NMT-pretreated uninoculated group of OPs (Table 3). In general, all the combined high diluted biomedicines treatments reduced root-knot disease significantly by decreasing nematode infection of the test okra plant s (Table 3).

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Table 3. Combined effects of the high diluted biomedicines; NMT- and AMT- treatments on the OPs[X]

Mean with S.E.[Y]											
Treatments Groups	**Fresh Biomass (g)**			**Number of Root Galls**	**Nematode Population**		**Protein Content (%)**		**Number of Fruits**	**Number of Proteins in Okra Root Callus**	
	Shoot	**Root**	**Fruits**		**Root (2g)**	**Soil (200g)**	**Root**	**Fruits**		**PR-Proteins**	**Total-Proteins**
Uninoculated Untreated	165.87e[Z] ±1.21	12.98f ±0.02	29.82d ±0.01	Nil	Nil	Nil	1.35cp ±0.01	1.89eq ±0.01	28c ±0.02	4	11
NMT-Pretreated Uninoculated	200.03a ±1.31	13.23f ±0.01	48.26a ±0.01	Nil	Nil	Nil	1.36cp ±0.02	2.56aq ±0.02	36a ±0.02	19	24
NMT-Pretreated Inoculated	198.03b ±1.01	14.02e ±0.04	38.99b ±0.01	59e ±3.51	54dp ±0.02	92aq ±7.08	1.31dp ±0.01	2.28bq ±0.02	35a ±0.01	22	23
Inoculated Untreated	146.08 ±1.02	24.96a ±0.08	09.08f ±0.01	1529a ±29.71	2763ap ±87.31	21eq ±5.01	3.98ap ±0.04	0.87gq ±0.03	11e ±0.03	14	15
NMT-Pretreated Inoculated AMT-Posttreated	189.87c ±0.91	15.01d ±0.01	36.68c ±0.01	68c ±2.02	56dp ±1.02	55bq ±7.01	1.35cp ±0.02	2.11cq ±0.07	33b ±0.01	18	20
Inoculated NMT-Posttreated	162.84e ±1.02	17.01c ±0.07	26.97e ±0.01	84b ±2.02	78bp ±2.12	48dq ±6.02	2.03bp ±0.03	1.84fq ±0.02	26d ±0.02	14	16
AMT-PretreatedInoculated	189.06c ±1.04	14.91d ±0.03	35.99c ±0.01	67c ±1.51	55dp ±1.98	56bq ±3.02	1.36cp ±0.02	2.10cq ±0.02	32b ±0.02	18	19
InoculatedAMT-Posttreated	172.09d ±1.27	19.03b ±0.01	29.79d ±0.03	62d ±2.12	62cp ±2.02	52cq ±5.06	1.37cp ±0.05	1.98dq ±0.08	29c ±0.03	16	18

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Footnotes:

'X'- Okra plants (OP) inoculated at 8-leaf stage (Day-12) with *M. incognita* larvae @3586±55J_2 /plants and harvested 85 days after showing of germinated seeds.

'Y'- Mean of five replicates with S.E., except the number of root protein groups.

'Z'- Means carrying same letters in a column and row of each character not significantly different (P≤0.05) by ANOVA.

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DISCUSSION

1. On growth of root callus (RC) and plants (OP)

It is proved that the ORC formation started within 5-7 days and after 15 days, vigorous callus growth occurred due to the presence of nutrient growth regulator (2 mg/1, 2,4-D) in MS-medium (Suguna and Vedivelu, 1993; Elele, 2012; Datta, 2020l,2020p,2021b,2021j, 2021k, 2021m,2021p,2021q,2021r,2021t,2021u, 2021v,2021w).

It is also proved that the okra plants (OP)-growth in terms of fresh biomass of shoot and fruits, and the number of fruits was higher than inoculated untreated groups in all the treatment groups of OP treated with the high diluted combined biomedicines; NMT and AMT, and NMT-treated groups followed by the groups which were treated with NMT and AMT (Suguna and Vedivelu, 1993; Elele, 2012; Datta, 2020l,2020p,2021b,2021j,2021k,2021m,2021p,2021q, 2021r,2021t,2021u, 2021v,2021w).

2. On root-knot (RK) nematodes in root callus (ORC) and plants (OP)

In the inoculated untreated ORC was taken out and examined at forty-five days of inoculation, and the presence of a large number of the juveniles-J_3 and females- (NF) was present in RC, but totally nil in the MS-culture-media due to high penetration, development, and multiplication rate, feeding place and feeding choice of the ORC than MS-culture-media in the culture tube (Suguna and Vedivelu, 1993; Elele, 2012).

All the inoculated pre-and post-treated ORC turned off-white to light brown color and loose-friable in texture after 28 to 30 days of inoculation due to indication of normal feeding and different developmental stages of the nematodes, and those turned dark-brown after 38 to 43 days due to excessive feeding of nematodes as well as the suitability of the callus for the development of mature *M. incognita* females (Suguna and Vadivelu, 1993; Elele, 2012; Datta, 2020l, 2020p, 2021b, 2021j, 2021k, 2021m,2021p,2021q,2021r,2021t,2021u, 2021v,2021w). It is interesting that the ratio of the initial and final population was higher in all pre-and post-treated callus than in inoculated untreated callus and the post-treated okra callus showed more juveniles than the media, and due to the absence of defensive-or resistance- a substance in okra root callus, there were no juveniles (J_3/J_2) present in the media in the case of inoculated untreated okra root callus tubes (Elele, 2012; Datta, 2020l, 2020p, 2021b,2021j, 2021k, 2021m, 2021p, 2021q,2021r,2021t,2021u,2021v,2021w).

All the treatment groups of okra plants treated with high diluted biomedicines; Nematode MT (NMT) and Aakashmoni MT (AMT) reduced nematode infestation in terms of root gall number and nematode population in root in comparison to inoculated untreated groups, and the population of nematode in the rhizospheric soil was the maximum with the group treated with combined high diluted biomedicines; NMT and AMT, and minimum with the inoculated untreated group, due to potential combined high diluted effects of drugs, and it is confirmed that both the biomedicines could induce synthesis of some antagonistic substance in the treated-ORC, which is proved from the inoculated untreated ORC contained the highest protein-content due to presence of a large number of nematodes (Chatterjee and Sukul, 1981; Datta and Mukherjee, 2021; Datta, 2019a, 2020a, 2020b, 2020h, 2020j, 2020l, 2020n, 2020p, 2021b, 2021j, 2021k, 2021m, 2021p, 2021q,2021r,2021t,2021u,2021v,2021w).

3. On the toxicity

It is also confirmed that the high-diluted-combined-biomedicines; NMT-and AMT had no direct toxic effects on nematodes, and okra root callus and plants, but it induced synthesis of some resistance substances in okra root callus or plants to *M. incognita* infection for preventing RK-diseases in the ORC-and-OP, and for these reasons, the biomass was highest in both the NMT-pretreated uninoculated callus and plants (except roots) respectively, and the uninoculated and untreated root-callus or plants, and inoculated treated respectively had significantly greater fresh biomass than inoculated untreated ORC, and shoot-and fruits- of plants respectively (Datta 2020l, 2020p, 2021b, 2021j, 2021k, 2021m, 2021p, 2021q,2021r,2021t,2021u,2021v,2021w).

4. On defense resistance or immunity

It is also confirmed that the high-diluted-combined-biomedicines; NMT-and-AMT act as potential preventive biomedicines against callus and plant diseases due to their defense resistance. It is known that the lectins accumulated in galled regions of the root of Hibiscus esculentus infected with the RK-disease (Das, *et al*., 1989). It is reported that the different crop plants can be induced by acquiring systemic-resistance for the localized virus- infection or non-pathogenic, and pathogenic-microorganisms or their culture-

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filtrates or nitric oxide or salicylic-acid, etc. protects callus or plants from the various pathogens attack, by working systemically (Ross, 1961; Descalzo, *et al*., 1990; Kuc' and Strobel, 1992; Merra, *et al*., 1994; Kiessig and Malamy, 1994; Kiessig, *et al*., 2000; Schneider, *et al*., 1996; Manuch-Mani and Metraux, 1998; Nandi, *et al*., 2002, 2003; Mukherjee, *et al*., 2020; Datta, 2020l, 2020p, 2021b, 2021j, 2021k, 2021m, 2021p, 2021q,2021r,2021t,2021u,2021v,2021w).

4.1. On okra root callus (ORC) pathogenesis related (PR)-proteins

McClure, *et al*., (1973) reported that the *M. incognita* is known to share common antigens with its host plants, and Iqbal, *et al*. (2020) also observed that the attempt to 'Silence Genes' of the root-knot nematode, *M. incognita* results in diverse responses including increase and no change in expression of some genes. So in the all the test-ORC show that all the high-diluted biomedicines; NMT and AMT-pretreatments resulted in the increased number of proteins or genes in the root-callus than posttreatment and inoculated untreated-RC-groups; the highest number of RC-proteins-genes in the high-diluted biomedicines NMT-pretreated group is 24, and next highest number of the RC- protein-gene is 23 in the pretreated-NMT inoculated-RC-group, and 20 in the pretreated-NMT inoculated AMT- posttreatment group, and the lowest number of protein is 11 in the uninoculated untreated RC-treatment-group and the 15 in the inoculated untreated RC respectively, which proved that during infection with the nematode, host plants showed minimal defense responses to the nematode because of this antigenic similarity, and the different PR-proteins-genes of the ORC ranging from 280kD (the highest molecular weight protein) to 11kD (the lowest molecular weight protein) of the ORC-protein. And both the high-diluted combined biomedicines; NMT and AMT stimulate the synthesis of various different PR-proteins-antigens-genes that must induce defense responses in which the nematodes fail to survive (Mukherjee, *et al*., 2020; Datta, 2020j, 2020n, 2021p,2021r,2021t,2021u,2021v,2021w; Iqbal, *et al*., 2020).

4.2. On okra plants (OPs) pathogenesis-related (PR)-proteins

Datta (2020j, 2020n) already reported that in the lady's finger plants treated with nematode extract showed the highest number of root protein but inoculated untreated root and uninoculated untreated root was a decrease in number, confirming again that both the high-diluted combined biomedicines; NMT and AMT act as a stimulus for the expression of many proteins-antigens, particularly the defense-related PR-protein-genes which latter provide resistance to nematode infection in OPs also, but it was interesting that the test plant was treated with the NMT and AMT after inoculation with live nematode did not show much increase in the number of PR-protein-genes in the root, which proved that nematode infestation somehow serve as a repressor for the expression of defense-gene in plants. It is also proved from the plant-nematode interaction, newly synthesized PR-proteins genes have been found in potato plants infected with the potato-cyst-nematodes *Globodera pallida* and *G. rostochiensis* (Hammond-Kosack, *et al*., 1989; Rahimi, *et al*., 1993, 1996). It is also reported that salicylic acid (SA) increases resistance in plants against RK-diseases by inducing expression and accumulation of pathogenesis related-I protein (14 KD, PR-I) in the sprayed plant-root and leaves, and it sprays enhances-PAL higher activity in infected-roots (Nandi, *et al*., 2002, 2003; Mukherjee, *et al*., 2020; Datta, 2020j, 2020n, 2021p,2021r,2021t,2021u,2021v,2021w).

4.3. On nematode pathogenesis-related (PR)-proteins

The sixteen-number of the PR-proteins-genes out of total eighteen-number of proteins-genes of NF of *M. incognita* in comparison to the uninoculated untreated group, and the molecular weight of the nematode-proteins ranging from lowest 12kD to highest 280kD, proved the potential efficacy of the high-diluted biomedicines-NMT use as an effective stimulus for the expression of these various new 16 defense-related PR-proteins-genes might be provided resistance to nematode-infection in ORC and OP also, and maybe preventing pathogenesis in patients with COVID-

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19 due to more or less proteins-genes range (240kD to 26kD) in different bovine- and human-coronavirus-structural-proteins which send genetic-information , and the SARS-CoV-2 genes may integrate with human-DNA to code the essential nonstructural-proteins like an RNA-polymerase also, and the nematode-proteins-genes slip into human-chromosomes and the diverse immunological-factors on viral-dissemination, immunotherapeutic-options, and inflammatory-responses, and need molecular-characterization and understanding of the human-coronavirus-life-cycle, structural and functional properties of SARS-CoV-2 spike-protein for potential antivirus-drug development, and analysis of therapeutic-targets for SARS-CoV-2 and discovery of potential-drugs by computational-methods, and genomic-characterization and epidemiology of 2019 or genomic-epidemiology has come of age during this pandemic affording to track SARS-CoV-2 sequences helped identify worrying-variants, with implications for virus-origins and receptor-binding also, for preventing the COVID-19,— but researchers are blind to emerging-mutations in some-regions, and so it is thought, "the next pandemic by transforming food-systems for affordable healthy-diets" (Datta, 2020j, 2020n; Rabaan, *et al*., 2021; Cohen, 2021a,2021b; Arpin and Talbo, 1990; King and Brain, 1982; Schoeman and Fielding, 2019; Cyranoski, 2021; Huang, *et al*., 2020; Wu, *et al*., 2020; Liu, *et al*., 2020; Eaton, 2021; FAO, *et al*., 2020). Recently it may help from the report that cellular senescence (SnC) contributes to inflammation, multiple-chronic-diseases, and age-related dysfunction, and the SnC become hyper-inflammatory in response to pathogen-associated-molecular-patterns (PAMPs), including SARS-CoV-2 Spike-protein-1, increasing expression of viral entry proteins and reducing anti-viral gene-expression in non-SnCs through a paracrine-mechanism (Camell, *et al*., 2021).

5. Linkagefor the development of vaccines against COVID-19 for humans

It is believed that the chapter needs additional discussion as to how these experiments are related to the development of vaccines against COVID-19 for humans. However, this linkage needs to be discussed in greater detail in this main text before it is moved into the discussion of potential COVID-19 vaccines for all reader's understanding, and it will be achieved from typical analysis or justifications of literature review, reports of different clinical research trials, or fields study or new treatment-methods and ideas, or hypotheses or suggestions for the education, research and prevention keys to extending global good health (2021i,2021j,2021l,2021p,2021r,2021t,2021u,2021v,2021w).

5.1. Through genetic similarity

In 'Genome Biology', the genetic material of human cells; the 145 genes from animals, and the various genes that gave the impression to are transferred from bacteria, archaea, fungi, other microorganisms, and plants to animals jumped from simpler organisms (Williams, 2015) and underpinning all organisms (Appels, *et al*., 2015). Approximately, a 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).

5.2. Through genetic and immune resistance mechanisms

The three host resistance mechanisms for the "Genetic Resistance to Coronavirus Infection"; -cellular receptors, -macrophage and -acquired immunity and 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 when the figure is attacked by germs, the system kicks into gear to repulse the assault (Buschman and Skamene, 2019; Zhang, *et al*., 2020; The Gene, 2020).

5.3. Through plant-based technology

In December 2019, the outbreak of COVID-19 in Wuhan city, China, Traditional Chinese Medicine was the source of the coronavirus pandemic, which comes from products of wildlife; like 'Tan Re Qing' from bear bile powder, scales of pangolins, and tiger, bovine pill, gallstone of cattle, buffalo horn, jasmine, and pearl, etc., (Yang, *et al*., 2020; Gorski, 2020; Standaert, 2020; Vyawahare, 2020; 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

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it could be used as potential therapeutic agents, and the World Health Organization, Africa, also welcomes for potential treatments for COVID-19 and develops vaccines by using 'Plant-based Technology' (CDC, 2020; Gómez, *et al*., 2019; IUCN,1993; WHO, 2020b; Yatoo, *et al*., 2020).

5.4. Throughhuman immunomics initiative

Human Immunomics Initiative (HII) deals, how the human immune system fights disease with advances in computing and artificial intelligence, genomics, systems biology, and bioinformatics for the development of vaccines (Sweeney, 2020).

5.5. Throughnature of binding

The coronavirus enters human cells by binding its viral spike protein to the membrane-bound form of them aminopeptidase angiotensin-converting enzyme 2 (ACE2), protease inhibitors, and angiotensin-receptor, thus increasing the availability of target molecules for SARS-CoV-2, and the T cells-immune warriors help us fight because they were previously infected with other coronaviruses (Buschman and Skamene,2019; Roujian,2020; Hoffmann, *et al*.,2020; John, *et al*.,2020; Cohen,2020).

5.6. Throughantigenic epitopes

It is known that the deep serological profiling of COVID-19 patients and pre-COVID-19 era controls using VirScan revealed epitopes, recognized by neutralizing antibodies for improving diagnostics, therapeutics, and vaccines, and also the antigenic epitopes could constitute an economical and safe alternative to the virus (Brennan, *et al*.,2001; Shrock, *et al*.,2020).

5.7. Throughviral nano-biotechnology

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

5.8. Throughcoronavirus updated dashboard

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

5.9. Through importance of biomedicines

It's worth mentioning that biomedicine could be a 'medicine for all' that applies biological and physiological principles to clinical practice, and is the cornerstone of recent health care and laboratory diagnostics. This general field of research includes many areas of both the life and physical sciences. Utilizing biotechnology techniques, biomedical researchers study biological processes and diseases with the final word goal of developing effective treatments and cures within the present study, reconnoiters the "Genetic effects of the biomedicines by preventing okra root-knot and COVID-19", and this is often a noteworthy study on biomedicines achieving the "Nature's-Gift to Human-Disease-Free-Healthy-Life" (Datta, 2021n,2021o,2021p,2021t,2021u,2021v,2021w).

5.10. Through multiple benefits of biomedicines

Nematodes MT or Aakashmoni MT or okra root callus or okra root galls or okra fruits, are the most cost-effective, non-toxic, easily-prepare-able, easily-available, easily-manufacture-able, easily-marketable, easily-equitable, easily-supply-able, side-effects free, emergency-care, personalized, and policy-developer-"Advances in Food-Security-Sustainability-Combined-Biomedicines" (2021i,2021j,2021l,2021p,2021r,2021t,2021u,2021v,2021w).

5.11. Through synthesis of newmolecular weight PR-protein-genes

In this study the highest number of root proteins is 24, molecular weight is 295kD and the lowest number is 11 and the molecular weight is 11kD respectively. But highest number of new PR-proteins is 22 and lowest number is 4 respectively, with different new molecular weight (kD) PR-proteins-genes that are many closely related proteins-genes ranging from 240kD to 26kD of different bovine- and human- coronavirus-structural-proteins which send genetic-information, and the SARS-CoV-2 genes may integrate with human-DNA to code the essential nonstructural-proteins like an RNA-polymerase also, and the nematode-proteins-genes slip into human-chromosomes and the diverse immunological-factors on viral-dissemination, immunotherapeutic-options, and inflammatory-responses, and need molecular-characterization and understanding of the human-coronavirus-life-cycle, structural and functional properties of SARS-CoV-2 spike-protein for potential antivirus-drug development, and analysis of therapeutic-targets for SARS-CoV-2 and discovery of potential-drugs by computational-methods, and

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genomic-characterization and epidemiology of 2019 or genomic-epidemiology has come of age during this pandemic affording to track SARS-CoV-2 sequences helped identify worrying-variants, with implications for virus-origins and receptor-binding also, for preventing the COVID-19,— but researchers are blind to emerging-mutations in some-regions, and so it is thought, "the next pandemic by transforming food-systems for affordable healthy-diets" (Rabaan, *et al*., 2021; Cohen, 2021a,2021b,2021c; Datta, 2021k,2021l,2021m,2021n,2021o,2021p,2021t, 2021u,2021v,2021w;Mukherjee, *et al*., 2020). Recently it may help from the report that cellular senescence (SnC) contributes to inflammation, multiple-chronic-diseases, and age-related dysfunction, and the SnC become hyper-inflammatory in response to pathogen-associated-molecular-patterns (PAMPs), including SARS-CoV-2 Spike-protein-1, increasing expression of viral entry proteins and reducing anti-viral gene-expression in non-SnCs through a paracrine-mechanism (Camell, *et al*., 2021).

5.12. Through advantage of saponin- and protein- based adjuvants

The natural product adjuvants, saponins containing acacia sides A and acacia sides B, and nematodes, etc., are common adjuvants, adding to vaccines to enhance the immunological response to an antigen. Here, the saponin based adjuvants have the ability to stimulate the cell-mediated immune system as well as to enhance antibody production and have the advantage that only a low dose is needed for adjuvant activity, and many saponins stimulate both the Th1-type immune response and the production of cytotoxic T lymphocytes against endogenous antigens, making them very useful for subunit vaccines, especially those for intracellular pathogens, and the structural characteristics, mechanisms of action, structure-activity relationship of saponins, biological activities, and use of saponins in various viral vaccines, and the nematode proteins (12kD to 280kD) may be the emerging data suggesting that recombinant protein vaccines indeed might offer an advantage viral vaccines that will likely reach the clinic faster on the nature and on the development status of recombinant subunit antigens and adjuvants targeting SARS-CoV-2 infections, and India approves Phase 3 clinical trials of Sanofi-GSK protein-based vaccine candidate will offer a significant contribution to the fight against the pandemic (Sharma, *et al*., 2020; Fernández-Tejada, *et al*., 2014; Iqbal, *et al*., 2007; Pollet, 2021; FE, 2021; Datta,2021i,2021j,2021l,2021p,2021r,2021t,2021u ,2021v,2021w).

6. Ideas for the development of potential vaccines against COVID-19

It is confirmed from the result, clarifications, and discussion with the treatments of both the high-diluted-combined-bio-medicines; NMT and AMT, not only enriched "Advanced In Food-Security-Sustainability-Agriculture-Biodiversity-Global-Climate-Health-Socio-Economy Science-Technology-Communication-Application-Issues" by reducing ORC-and OPs-diseases for the induction of potential defense-resistance, but also helped to develop "Vaccine or Treatments or Social-Vaccine Ideas As Effective Preventive Potential Bio-medicines Vaccines Against COVID-19" by boosting natural innate immunity for the new pathogenesis-related (PR) proteins-genes in treated root-callus, roots, and nematode-proteins-genes which are more or less within the range of 'Coronavirus-Structural-Proteins-Genes'. Recently researchers claim they have sequenced the entirety of the human genome — including the missing parts which may help to the development of potential antivirus-drug or active and efficient vaccines against different strains of this virus from its structure, function, origin, evolution, genomic organization, epidemiology, and molecular- and cellular-characteristics, and development of genes, and the diagnostic-and treatment-approaches, and its impact on global health, environment, and economy, to eradicate this disease from the universe also by resisting around the globe (Datta, 2020j,2020n,2021i,2021j,2021l,2021p,2021r,2021t ,2021u,2021v,2021w; Rabaan, *et al*., 2021; Cohen, 2021a, 2021b; Arpin and Talbo, 1990; King and Brain, 1982; Schoeman and Fielding, 2019; Arpin and Talbot, 1990; Cyranoski, 2021; Huang, *et al*., 2020; Wu, *et al*., 2020; Liu, *et al*., 2020; Lu, *et al*., 2020; Eaton, 2021; FAO, *et al*., 2020; Herper, 2021; Ullah, *et al*., 2021; Attia, *et al*., 2021).

6.1. Vaccine Idea-I

The high-diluted-bio-medicines vaccine will be prepared by the use of combined adjuvant or placebo of both the high-diluted-bio-medicines; NMT and AMT, in the ratio 1:1 [v/v; NMT 0.05ml + AMT0.05ml = Total 0.1 ml combined- adjuvant or placebo bio-medicines] mixed with 2.5µg of recombinant spike protein of coronavirus at a dose of twice in a year per adult at an interval of six-months OR single-dose for the children before the onset of COVID-19 or 7-days after the symptomatic Covid-19 or more-days, and applied

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after getting permission regarding vaccine-safety and vaccine-efficacy etc. from the authentic concerned-authorities like the World Health Organization (WHO) , U.S. National Library of Medicine (NLM), the National Institutes of Health (NIH) or the U.S. Federal Government (USFG) or other agencies like Indian Council of Medical Research (ICMAR) of Government of India etc., and distribution and its effects regarding; availability, production, rates of vaccination, coordination between agencies, vaccine-hesitancy and global-health-equity maintain ethical-and social- justice for all by reducing severity of disease and costs, and promoting physical-and mental-health (Shinde, *et al*., 2021; Hyder, *et al*.,2021; NIH, 2017; WHO, 2021; Datta, 2020a, 2020b, 2020h, 2020j, 2020l, 2020n, 2020p, 2021b, 2021f, 2021i, 2021j, 2021p,2021r,2021t,2021u,2021v,2021w). It is assumed that these saponins- and nematode-protein- nanoparticle-based high-diluted-bio-medicines vaccine will be effective like NVX-CoV2373 Covid-19 Vaccine against the B.1.351 variant also, forming the "Vaccine-Breakthrough-Infections with Variants of SARS-CoV-2" (Shinde, *et al*., 2021; Nixon and Ndhlovu, 2021). It is an important point for its merits and the basis of this assumption. It is already mentioned that saponins- and nematode-proteins, ranging from 11kD to 195kd like different coronavirus proteins, are very potential adjuvants or recombinant proteins for the potential biomedicine vaccines development, and the NVX-CoV2373 vaccine (Novavax), a recombinant nanoparticle vaccine against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that contains the full-length spike glycoprotein of the prototype strain plus Matrix-M adjuvant, showed that the vaccine was safe and associated with a robust immune response in healthy adult participants, and a two-dose regimen of the NVX-CoV2373 vaccine administered to adult participants conferred 89.7% protection against SARS-CoV-2 infection and showed high efficacy against the B.1.1.7 variant (Heath, *et al*., 2021; Sharma, *et al*., 2020; Fernández-Tejada, *et al*., 2014; Iqbal, *et al*., 2007; Pollet, 2021; FE, 2021). So, these combined adjuvants act as potential high-diluted-nanoparticle bio-medicines-vaccine; NMT and AMT maybe become acceptable for safety, forming strong neutralizing-antibody and antigen-specific poly-functional CD4+ T-cell-responses, and so it is requested the concerned authorities to evaluate the vaccine-efficacy setting of ongoing recent SARSCoV-2 transmission around the world, and it will be the most potential-vaccine against different-variants from Alpha to Omega (Shinde, *et al*., 2021; Datta, 2021i, 2021j, 2021l, 2021o, 2021p,2021r,2021t,2021u,2021v,2021w; Callaway, 2021). And the NVX-CoV2373, its recombinant nanoparticle protein-based COVID-19 vaccine, demonstrated 100% protection against moderate and severe disease, 90.4% efficacy overall, and met the primary endpoint in its PREVENT-19 pivotal Phase 3 trial (Gaithersburg, 2021). NVX-CoV2373 (Novavax),similar to inactivated pathogen vaccines, protein subunit candidates usually exhibit an extremely favorable safety profile but require multiple boost doses and elicit low grade cellular responses (Kyriakidis, *et al*., 2021).But it is not always cheap, easily – prepare-able and -available for emergency application in low-and middle-income countries like India (Werner, *et al*., 2020; Datta, 2020a, 2020b, 2020h, 2020j,2020l, 2020n, 2020p,2021b, 2021f, 2021i,2021j,2021r,2021t, 2021u,2021v,2021w), and this vaccine may reduce the spread of creating fresh uncertainty, the Delta variant SARS-CoV-2 also (Mallapaty, 2021).

6.2. Vaccine Idea-II

The high-diluted-biomedicines-NMT-vaccine will be prepared by the use of the adjuvant or placebo of the high-diluted-bio-medicines; Nematode MT @ 0.1 ml adjuvant or placebo biomedicines-NMT mixed with 2.5µg of the recombinant-spike-protein of coronavirus at a dose of thrice within two years per adult at an interval of eight months OR double-dose per children within two years at an interval of six-months before the onset of COVID-19 or 7-days after the symptomatic Covid-19 or more days, and applied after getting permission regarding vaccine-safety and vaccine-efficacy, etc. from the authentically concerned-authorities of health (Shinde, *et al*., 2021; Hyder, *et al*.,2021; NIH, 2017; WHO, 2021; Datta, 2020a, 2020b, 2020h, 2020j, 2020l, 2020n, 2020p, 2021b, 2021f, 2021i, 2021j, 2021p,2021r,2021t,2021u,2021v,2021w). It is known that pharmacogenomics and COVID-19, has clinical implications of human-genome interactions with repurposed-drugs, and it may form one of the best vaccines for its genetic double-load and similarity between coronavirus and nematode-protein-genes, and it will also be the most potential vaccine against different variants (Badary, 2021; Datta, 2021i, 2021j, 2021l, 20210, 2021p,2021r,2021t,2021u,2021v,2021w).

The "similarity between coronavirus and nematode-protein-genes in the discussion of

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Vaccine Idea II", is central to the argument of the chapter, a bit more discussion is essential. It is already mentioned that; the 16 PR-proteins-genes out of total 18 proteins-genes of nematode female proteins (NFP) of *M. incognita* in comparison to the uninoculated untreated group, and the molecular weight of the nematode-proteins-genes ranging from lowest 12kD to highest 280kD, proved the potential efficacy of the high-diluted biomedicines NMT, use as an effective stimulus for the expression of these various new 16 defense-related PR-proteins-genes might be provided resistance to nematode-infection in okra, and it can be preventing pathogenesis in patients with COVID-19 due to more or less proteins-genes range 240kD to 26kD like 190kD–200 kD, 140kD,120kD, 100kD, 88–97 kD, 65kD,52–53 kD, 52kD,25–26 kD, 26kD, 20kD–22 kD, and>200 kD, etc.in different bovine- and human-coronavirus-structural-proteins which send genetic-information, and the SARS-CoV-2 genes may integrate with human-DNA to code the essential nonstructural-proteins like an RNA-polymerase also, and the nematode-proteins-genes slip into human-chromosomes and the diverse immunological-factors on viral-dissemination, immunotherapeutic-options, and inflammatory-responses, and need molecular-characterization and understanding of the human-coronavirus-life-cycle, structural and functional properties of SARS-CoV-2 spike-protein for potential antivirus-drug development, and analysis of therapeutic-targets for SARS-CoV-2 and discovery of potential-drugs by computational-methods, and genomic-characterization and epidemiology of 2019 or genomic-epidemiology has come of age during this pandemic affording to track SARS-CoV-2 sequences helped identify worrying-variants, with implications for virus-origins and receptor-binding also, for preventing the COVID-19,— but researchers are blind to emerging-mutations in some-regions, and so it is thought, "the next pandemic by transforming food-systems for affordable healthy-diets" (King and Brain, 1982; Arpin and Talbot, 1990; Rabaan, *et al*., 2021; Cohen, 2021a,2021b,2021c; Datta,2021k,2021l,2021m,2021n,2021o,2021r,2021t,2021u,2021v,2021w; Mukherjee, *et al*., 2020). Recently it may help from the report that cellular senescence (SnC) contributes to inflammation, multiple-chronic-diseases, and age-related dysfunction, and the SnC become hyper-inflammatory in response to pathogen-associated-molecular-patterns (PAMPs), including SARS-CoV-2 Spike-protein-1, increasing expression of viral entry proteins and reducing anti-viral gene-expression in non-SnCs through a paracrine-mechanism (Camell, *et al*., 2021).But it is better than previous combined-NMT-AMT-vaccines due to comparatively cheap, easily -collectable and -available for emergency-application in low-income-groups (Werner, *et al*., 2020; Datta, 2020a,2020b,2020h,2020j,2020l,2020n,2020p,2021b,2021f,2021i,2021j,2021r, 2021t, 2021u,2021v,2021w).

6.3. Vaccine Idea-III

The high-diluted-bio-medicines AMT-vaccine will be prepared by the use of the adjuvant or placebo of the high-diluted-bio-medicines; Aakashmoni MT @ 0.1 ml adjuvant or placebo biomedicines-AMT mixed with 5µg of the recombinant-spike-protein of coronavirus at a dose of thrice within two years per adult at an interval of eight months OR double-dose per children within two-years at an interval of 10 to 12-months before the onset of COVID-19 or 7-days after the symptomatic Covid-19 or more days, and applied following first one (Said, 2020; Balfour, 2020; Shinde, *et al*., 2021; Hyder, *et al*.,2021; NIH, 2017; WHO, 2021; Datta, 2020a, 2020b, 2020h, 2020j, 2020l, 2020n, 2020p, 2021b, 2021f, 2021i, 2021j, 2021p). It is known that the AMT-adjuvant is saponin-based epidemic vaccines like Novavax which has shown a "potent-and well-tolerated effect" boosting immune-responses, and the NVX-CoV2373 Covid-19 Vaccine is already going for a phase 1–2 trial against the B.1.351 variant involving healthy-adults (Balfour, 2020; Shinde, *et al*., 2021; Datta, 2020a, 2020b, 2020h, 2021i, 2021j, 2021l, 20210, 2021p). And this nanoparticle-based high-diluted-bio-medicines-AMT-vaccines will also be the best-vaccines due to cheap, easily-marketable and -available for emergency-application in low-income-groups (Werner, *et al*., 2020; Datta, 2020a, 2020b,2020h, 2020j, 2020l,2020n, 2020p, 2021b, 2021f,2021i,
2021j,2021r,2021t,2021u,2021v,2021w).

6.4. Vaccine Idea-IV

The combined-adjuvant or placebo of both the high-diluted-bio-medicines; NMT and AMT, may be used with different anti-Human antibodies like IgG, IgM, and IgA, for the preparation of the vaccines of COVID-19, and it may also be effective-vaccines because it is known as the "Shared B-cell memory to coronaviruses and other pathogens vary in human age groups and tissues", and after achieving successful clinical-trials, the concerned authorities, may be sanctioned to use as effective-emergency-NMT-AMT-vaccines (NIH,

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2017; Said, 2020; Werner, *et al*., 2020; Yang, *et al*., 2021; Science Advisory Board, 2020; Datta, 2020a,2020b, 2020h,2020j,2020l,2020n, 2020p,2021b,2021f, 2021i, 2021j,2021r,2021t,2021u,2021v,2021w).

6.5. Vaccine Idea-V

The adjuvant or placebo of the high-diluted-bio-medicines NMT or AMT; may be used separately with different anti-Human antibodies like IgG, IgM, and IgA, for the preparation of the COVID-19 NMT or AMT-vaccines which may also be effective vaccines for its "Shared B-cell memory to coronaviruses and other pathogens vary in human age groups and tissues", and may be used as effective-emergency-NMT-AMT-vaccine following all protocols (NIH, 2017; Said, 2020; Werner, *et al*., 2020; Yang, *et al*., 2021; Science Advisory Board, 2020; Datta, 2020a, 2020b,2020h,2020j,2020l,2020n,2020p,2021b,2021f,2021i,2021j,2021r,2021t,2021u,2021v, 2021w).

6.6. Vaccine Idea-VI

Maintain all vaccine-protocols, the emergency cost-effective easy applicable NMT-AMT-vaccines for all will be prepared by the use of the combined-high-diluted-bio-medicines liquid; NMT and AMT, in the ratio 1:1 [v/v; NMT 0.05ml + AMT0.05ml = Total 0.1 ml combined-bio-medicines] is mixed with @10-12ml moderately-hot of sterile-double-distilled water or pure-drinking water orally administered, or taking orally @ 2-3 times/day for weeks, before taking any kinds of biomedicine-meals, against coronavirus-2 infections, 30-days before symptom onset OR illness onset OR onset of symptoms where patients in hospitalized due to COVID-19, applying as an emergency-treatment, and the doses may be increased depending on the intensity of diseases suggested by the treating-doctors after getting permission from the appropriate-authority (NIH, 2017; Said, 2020; Nalbandian, *et al*., 2021; Datta, 2020a, 2020b, 2020d, 2020e, 2020f, 2020g, 2020h, 2020j, 2020k, 2020l, 2020n, 2020p, 2020q, 2021a, 2021b, 2021e,2021f,2021g,2021i,2021j, 2021l,2021m,2021n,2021o,2021p,2021q,2021r,2021t,2021u, 2021v,2021w).

6.7. Vaccine Idea-VII

The emergency-applicable of the ultra-high diluted-biomedicines-vaccines; 'Nematode 30C, Nematode 200C and Nematode 1000C, OR Aakashmoni 30C, Aakashmoni 200C and Aakashmoni 1000C '-liquid (for diabetic-patients), @ 10-12 drops mixed with @10-12ml moderately-hot of sterile double-distilled-water or pure-drinking-water, maybe orally administered or taking orally @ 2-3 times/day for 15 days, before taking any kinds of biomedicine-meals, against coronavirus-2 infections, before symptom onset OR illness onset OR onset of symptoms where patients in hospitalized due to COVID-19, applying directly as an emergency-treatment-vaccine (due to cross the Avogadro number i.e., 6.023 X 1023), and the doses may be increased depending on the intensity of diseases suggested by the treating-doctors also (Nalbandian, *et al*., 2021; Datta, 2020a, 2020b, 2020d, 2020e, 2020f, 2020g, 2020h, 2020j, 2020k, 2020l, 2020n, 2020p, 2020q, 2021a, 2021b, 2021e, 2021f, 2021g, 2021i, 2021j, 2021l, 2021m,2021n, 2021o,2021p,2021q,2021r,2021t,2021u,2021v,2021w). It is one of the cost-effective and easily-prepare-able and –available-drug vaccines that may be applied directly for the emergency-personalized-vaccine because it is well known that Avogadro limit washed out by Nano-associates of water which carriers in serial-dilutions and end up with the generalized concept of medicines that structures, in their turn, influence near-matching bio-molecules to serve as medicines, like antibiotics, leading to a generalized concept of medicine (Mahata, 2017).

6.8. Vaccine Idea-VIII

The emergency-applicable of the ultra-high diluted-biomedicines-'Nasal-Vaccines';
'Nematode 30C, Nematode 200C and Nematode 1000C, OR Aakashmoni 30C, Aakashmoni 200C and Aakashmoni 1000C '-liquid for all, is prepared by 10-drops of medicines mixing with 20 ml of moderately hot of sterile-double-distilled water, maybe administered @2-4 drops of 'Nasal-Vaccines' (mixer-medicine) moistening the nasal-cavity, applied through the each nostril @ 2-3 times/day for 15 days, against coronavirus-2 infections, before symptom onset OR illness onset OR onset of symptoms where patients in hospitalized due to COVID-19, applying directly as an emergency treatment vaccine also due to cross the Avogadro number, and the doses may be depend on the treating-doctors, and stored at 4oC (Nalbandian, *et al*., 2021; Datta, 2020a,2020b, 2020d,2020e,2020f,2020g,2020h,2020j,2020k,2020l,2020n,2020p,2020q,2021a, 2021b, 2021e, 2021f,2021g,2021i,2021j,2021l,2021m,2021n,2021o,2021p,2021q,2021r,2021t,2021u,2021v, 2021w; Paul, 2021; Kwon, 2021). The ultra-high diluted biomedicines-'Nasal-Vaccines' will be the most effective in all respect because it is already reported that the scientists create a hybrid-antibody

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of SARS-CoV-2 that could be used for an extra-line of defense for people who might not be fully protected by vaccines, and the IgM molecules are relatively stable, for its the feasibility to formulate them into a nasal spray for emergency use, and Dr. Paul (2021) already says, "Vaccine hesitancy must end; nasal-vaccine candidate could be a game-changer" (Kwon, 2021; Paul, 2021).

6.9. Vaccine Idea-IX

Use ultra-high diluted biomedicines-'Mask-Vaccine'; 'Nematode 30C, Nematode 200C, and Nematode 1000C, OR Aakashmoni 30C, Aakashmoni 200C and Aakashmoni 1000C ' – liquid@2-4 drops of liquid-medicines soaked in the inner side of the N95 Respirator- or double-layered-Surgical-Mask near the nostril-position, and maybe also very effective due to presence of nanoparticle in mask that could be used by anyone who has been exposed to SARS-CoV-2, and as an extra-line of defense, and it might be also acting as an inner-nasal spray for emergency use, and the severe COVID-19 could the nose be key to prevention (Nalbandian, *et al*., 2021;Lang, 2021; Datta, 2020a, 2020b, 2020d, 2020e, 2020f, 2020g, 2020h, 2020j, 2020k, 2020l, 2020n, 2020p,2020q, 2021a, 2021b,2021e,2021f,2021g,2021i,2021j,2021l, 2021m,2021n, 2021o,2021p, 2021q,2021r,2021t,2021u,2021v,2021w; Kwon, 2021; Paul, 2021).

6.10. Vaccine Idea-X

For nondiabetic general-patients, the emergency-applicable of the ultra-high diluted biomedicines-vaccines; 'Nematode 30C, Nematode 200C and Nematode 1000C, OR Aakashmoni 30C, Aakashmoni 200C and Aakashmoni 1000C '– globules, @ 10-12 medicated-globules (7.2mg), are mixed with 50-60 ml (a half-cup) of moderately-hot-sterile-distilled-or pure-drinking-water orally-administered, or taking orally @ 2-3 times/day for 15-days, applying directly as an emergency-treatment-vaccine also (due to cross the Avogadro number i.e., 6.023 X 1023), before taking bio-medicinal-meals, against naturally occurring coronavirus infections before the symptom onset OR illness onset OR onset of symptoms where patients in hospital-associated COVID-19 infections has been used as emergency-treatments, and the doses may be increased depending on the intensity of diseases in case of treatment (Nalbandian, *et al*., 2021; Datta, 2020a, 2020b, 2020d, 2020e, 2020f, 2020g, 2020h, 2020j, 2020k, 2020l, 2020n, 2020p, 2020q, 2021a, 2021b, 2021e, 2021f, 2021g, 2021i, 2021j, 2021l, 2021m, 2021n, 2021o, 2021p, 2021q). It is also one of the most cost-effective and easily-prepare-able and –available drug vaccines that may be applied directly for the emergency-personalized-vaccine-like antibiotics, leading to a generalized concept of medicine (Mahata, 2017).

7. Future ideas in research on advances in food security and sustainability

It is already seen that emphasis on the most economically-important number-one consumption as biomedicines-vegetable-crop okra, the 'Nature's-Gift to human-disease-free-healthy-life', highlights potential role of pant-based-diet, piscatorial diets, and some future-ideas has given on advances in food-security and sustainability to overcome the future-pandemic COVID-19 (Kim, *et al*., 2021; Berman, 2021; Datta and Datta, 2011b, 2012a, 2012b, 2012c, 2013, 2017; Datta and Mukherjee, 2021; Datta, 1999, 2019a, 2020a, 2020b, 2020c, 2020d, 2020e, 2020f, 2020g, 2020h, 2020i, 2020j, 2020k, 2020l, 2020m, 2020n, 2020o, 2020p, 2020q, 2021a, 2021b, 2021e, 2021f, 2021i, 2021m, 2021o, 2021p,2021q,Use ultra-high diluted biomedicines-'Mask-Vaccine'; 'Nematode 30C, Nematode 200C, and Nematode 1000C, OR Aakashmoni 30C, Aakashmoni 200C and Aakashmoni 1000C ' – liquid@2-4 drops of liquid-medicines soaked in the inner side of the N95 Respirator- or double-layered-Surgical-Mask near the nostril-position, and maybe also very effective due to presence of nanoparticle in mask that could be used by anyone who has been exposed to SARS-CoV-2, and as an extra-line of defense, and it might be also acting as an inner-nasal spray for emergency use, and the severe COVID-19 could the nose be key to prevention (Nalbandian, *et al*., 2021;Lang, 2021; Datta, 2020a, 2020b, 2020d,2020e,2020f, 2020g,2020h,2020j,2020k,2020l,2020n,2020p, 2020q, 2021a,2021b,2021e, 2021f,2021g,2021i, 2021j, 2021l,2021m, 2021n, 2021o,2021p,2021q,2021r,2021t,2021u,2021v, 2021w,2022a; Kwon, 2021; Paul, 2021).

7.1. Vaccine Idea-XI

The combined-'Fruit-Vaccine' may be prepared with high-diluted-bio-medicines NMT and AMT@ 4-drops each mixed with okra-fruits may be consumed as biomedicines @ 50g (half-cup) twice-daily at an interval of 4hrs for 15-days, against coronavirus-2 infections, before symptom-onset OR illness-onset OR onset of symptoms where patients in hospitalized due to COVID-19, applying directly as an emergency-treatment-vaccine due to okra use as the edible-

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biomedicines. It will be the most; cost-effective, easily-available, safe-edible, and easily-prepare able as well as and safe alternative to live-replicating COVID-19 combined-high-diluted-biomedicines-NMT-AMT-Vaccines (Datta and Datta, 2011b, 2012a, 2012b, 2012c, 2013, 2017; Datta and Mukherjee, 2021; Datta, 2020d, 2020e, 2020f, 2020g, 2020h, 2020j, 2020k, 2020l, 2020n, 2020p, 2020q, 2021a, 2021b, 2021e, 2021f, 2021i, 2021m, 2021o, 2021p,2021q,Use ultra-high diluted biomedicines-'Mask-Vaccine'; 'Nematode 30C, Nematode 200C, and Nematode 1000C, OR Aakashmoni 30C, Aakashmoni 200C and Aakashmoni 1000C ' – liquid@2-4 drops of liquid-medicines soaked in the inner side of the N95 Respirator- or double-layered-Surgical-Mask near the nostril-position, and maybe also very effective due to presence of nanoparticle in mask that could be used by anyone who has been exposed to SARS-CoV-2, and as an extra-line of defense, and it might be also acting as an inner-nasal spray for emergency use, and the severe COVID-19 could the nose be key to prevention (Nalbandian, *et al*., 2021;Lang, 2021; Datta, 2020a, 2020b, 2020d, 2020e, 2020f, 2020g, 2020h, 2020j, 2020k, 2020l, 2020n, 2020p, 2020q, 2021a, 2021b, 2021e, 2021f, 2021g, 2021i, 2021j, 2021l, 2021m, 2021n, 2021o, 2021p, 2021q,2021r,2021t,2021u,2021v, 2021w; Kwon, 2021; Paul, 2021).

7.2. Vaccine Idea-XII

The combined-high-diluted-RK-infected ORC- and RG-extracts or –MT may be one of the most effective-emergency use biomedicines-vaccines due to non-toxic-effect on human (Datta, 2020d, 2020e, 2020f, 2020g, 2020h, 2020j, 2020k, 2020l, 2020n, 2020p, 2020q, 2021a, 2021b, 2021e, 2021f, 2021i, 2021m, 2021o, 2021p,2021q).

7.3. Vaccine Idea-XIII

The emergency-applicable of the ultra-high diluted-biomedicines- 'Root Callus- OR Roots Galls- Vaccines'; Root Callus 30C, Root Callus 200C, Root Callus 1000C, and Roots Galls 30C, Roots Galls 200C, Roots Galls 1000C-liquid for all patients, and globules- for nondiabetic and general patients, may be prepared like previous one (Datta, 2020d, 2020e, 2020f, 2020g, 2020h, 2020j, 2020k, 2020l, 2020n, 2020p, 2020q, 2021a, 2021b, 2021e, 2021f, 2021i, 2021m, 2021o, 2021p,2021q,2021r,2021t,2021u,2021v, 2021w).

7.4. Vaccine Idea-XIV

The combined-'Steam-Inhalation-Vaccines' may be prepared with high-diluted-NMT-AMT @ 4-drops each OR ultra-high-diluted-biomedicines; 'Nematode 30C, Nematode 200C and Nematode 1000C, OR Aakashmoni 30C, Aakashmoni 200C and Aakashmoni 1000C '- liquid@10-drops each, both mixed with 200ml sterile-drinking-water, may be use as effective-emergency-personalized-'Steam-Inhalation-Vaccines' (Datta, 2020d, 2020e, 2020f, 2020g, 2020h, 2020j, 2020k, 2020l, 2020n, 2020p, 2020q, 2021a, 2021b, 2021e, 2021f, 2021i, 2021m, 2021o, 2021p,2021q,2021r,2021t,2021u,2021v, 2021w).

7.5. Vaccine Idea-XV

The combined-plant-based-nanoparticles-'Epitope-Vaccines' may be prepared with high-diluted-'NMT-AMT' OR ultra-high-diluted-biomedicines; 'Nematode 30C, Nematode 200C, and Nematode 1000C, OR Aakashmoni 30C, Aakashmoni 200C and Aakashmoni 1000C '- liquid, and the different okra-plant-virus; Okra-Yellow-Vein-Mosaic-Virus and Okra-Enation-Leaf-Curl-Virus, which has been developed as antigenic-epitopes derived from the vaccine-targets COVID-19 infectious-epidemic-disease-agents, and the chimeric-virus-particles to elicit protective immunity from COVID-19 infection (Hema, *et al*., 2019; Brennan, *et al*., 2001; Kuete, *et al*., 2017; Datta, 2020d, 2020e, 2020f, 2020g, 2020h, 2020j, 2020k, 2020l, 2020n, 2020p, 2020q, 2021a, 2021b, 2021e, 2021f, 2021i, 2021m, 2021o, 2021p,2021q).

7.6. Vaccine Idea-XVI

The most potential-multiple-benefited-'Advances in Food-Security-Sustainability-Vaccine' may be prepared by the respected farmers; by uprooting and using gall-roots as vaccines, controlling plant-diseases, and marketing the bio-medicinal okra-fruits as vaccines, different intercropping as preventive-vaccines, and virally-infected-leaves use for vaccines formulation also, resulting in different advantages like; land-equivalent-ratio, benefit-cost-ratio, monetary-advantage, productivity, and its socio-economic-benefits with "Advanced in Food Security-Sustainability-Agriculture" with biodiversity, global-health, clinical-drug-discovery and development, education, research, climate-change, chemicals-usage, science-technology-communication, and application-issues (Hema, *et al*., 2019; Brennan, *et al*., 2001; Kuete, *et al*., 2017; Datta, 2020d,2020e, 2020f, 2020g,2020h, 2020j,2020k,2020l,2020n, 2020p, 2020q,2021a, 2021b,2021e, 2021f, 2021i,2021m, 2021o, 2021p,2021q,2021r,2021t,2021u,2021v, 2021w,2021x).

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7.7. Vaccine Idea-XVII

Maintaining physical distance, hand-sanitization, and use Double-N95 Respirator- or Double-/-Triple-layered Surgical-Mask as Life-Long Non-Medicine-Vaccine for all following COVID-19 protocol (Datta, 2020e, 2020i, 2021c, 2021h, 2021k, 2021n, 2021l, 2021q; Zamora-Ledezma, *et al*., 2020).

These are the most combined-potential-high-diluted or ultra-high-diluted-biomedicines, cost-effective, emergency-care, personalized, non-toxic, easily-prepare-able, easily-available, easily-manufacture-able, marketable, equitable, supply-able, side-effects free, and policy-initiative-'Advances in Food-Security-Sustainability-Combined-Biomedicine-Vaccines' OR most effective treatment-medicines or drugs, which will fulfill the social-strategies issues by maintaining the "Vaccine-Nationalism to Vaccine-Equity— Finding a-Path-Forward" with the "Vaccine-Passports for Common-Global-Health-Conference-Inequity and-Promoting-Equity for Women in Medicine — Seizing a Disruptive-Opportunity" for all from the poor to rich one in this new-normal-frightening COVID-19 pandemic-situation for advances in food security and sustainability, achieving from the use of combined-high-diluted-biomedicine OR ultra-high-diluted-biomedicines, with different-parts of edible-okra as RC or RG or fruits (Katz, *et al*., 2021; Werner, *et al*., 2020; Pai, 2021; Hema, *et al*., 2019; Brennan, *et al*., 2001; Kuete, *et al*., 2017; Jagsi, *et al*., 2021; Datta, 2020d, 2020e, 2020f, 2020g, 2020h, 2020j,2020k, 2020l, 2020n,2020p, 2020q,2021a,2021b,2021e,2021f, 2021i, 2021m,2021o, 2021p,2021q,2021r,2021t,2021u,2021v, 2021w,2021x,2023a,2023b,2023c).

In near future, the synthetic-production of particular molecular-weight-proteins-genes of the antigen of this biomedical research will enrich the 'Advances in Food-Security-Sustainability against COVID-19' by identifying and implementing more promising therapeutics further to reduce future-pandemic-complications of SARS-CoV-2 infections in COVID-19. Because the scientists are searching for challenges and an opportunity for potential-designing a stronger public-health-system for the future by identifying and tracking SARS-CoV-2 variants, and the 'Coronavirus-Structural-Proteins-Genes'.Because SARS-CoV-2 viruses promote their own spread and virulence by hijacking human proteins, which occurs through viral protein recognition of human targets. So, it is necessary to sequence and the entirety of the human genome — including the missing-parts, and the genomic-tools help researchers understand how SARS-CoV-2 is evolving, which may help to the development of potential-antivirus-drug or active and efficient vaccines against different strains of this virus from its structure, molecular-studies and molecular-dynamics-simulations to search for drugs or drug-like molecules that might block the interaction, function, origin, evolution, genomic organization, epidemiology, and molecular and cellular characteristics, functional pan genomic analysis, mutation tracking, and previous evidence, on Envelope (E)-protein as a determinant of pathogenicity in SARS and development of genes, and the diagnostic and treatment approaches, and its impact on global-health, environment, and economy, to eradicate this disease from the universe also by resisting terrifying-inning around the globe (Becker, 2021; Chai, *et al*., 2021; Black, S., 2020; Black, S., 2021; Alam, *et al*., 2020; Datta, 2020j, 2020n,2021r,2021t,2021u,2021v, 2021w; Rabaan, *et al*., 2021; Cohen, 2021a, 2021b; Arpin and Talbo, 1990; King and Brain, 1982; Schoeman and Fielding, 2019; Arpin and Talbot, 1990; Cyranoski, 2021; Huang, *et al*., 2020; Wu, *et al*., 2020; Liu, *et al*., 2020; Lu, *et al*., 2020; Eaton, 2021; FAO, *et al*., 2020; Herper, 2021; Ullah, *et al*., 2021; Attia, *et al*., 2021).

CONCLUSIONS

From the use of combined-high-diluted biomedicine OR ultra-high-diluted-biomedicines, with different edible-parts of okra; root-callus or root-galls or fruits, it can be concluded that the most combined-potential-high-diluted or ultra-high diluted-biomedicines, prepared from Nematodes MT or Aakashmoni MT or okra root callus or okra root galls or okra fruits, will be the most cost-effective, emergency-care, personalized, non-toxic, easily-prepare-able, easily-available, easily-manufacture-able, easily-marketable, easily-equitable, easily-supply-able, side-effects free, and policy-initiative-'Advances in Food-Security-Sustainability-Combined-Biomedicine-Vaccines' OR most-effective-treatment-medicines or drugs, which will fulfil the social-strategies-issues by maintaining the "Vaccine-Nationalism to Vaccine-Equity— Finding a Path Forward" with the "Vaccine-Passports for Common-Global-Health-Conference-Inequity And-Promoting-Equity for Women in Medicine — Seizing a Disruptive-Opportunity" for all from the poor to rich one in this new-normal-frightening COVID-19 pandemic situation for advances in food security and

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sustainability by improving defense resistance or immunity.

And the different pathogenesis-related (PR)-proteins-genes of the okra and nematodes ranging from 280kD (the highest molecular weight protein) to 11kD (the lowest molecular weight protein)with the combined biomedicines stimulate the synthesis of various different pathogenesis-related (PR)-proteins-antigens-genes that must induce defense-responses in which the pathogens fail to survive, and the mechanisms of pathogenesis can aid in the production of effective 'Anti-Coronavirus-Agents' OR 'Vaccine' OR 'Combined-High-Diluted-Cheap-Eco-Friendly-Non-Toxic-Non-Pollutant-Emergency-Applicable-Biomedicines-Vaccines' against "COVID-19, Root-Callus-and-Plant-Diseases" enriching "Food-Security Sustainability-Agriculture-Biodiversity-Global-Climate-Health-Socio-Economy Medical-Science-Technology-Communication-Application-Issues". The synthetic production of particular molecular weight PR-proteins or PR-genes of the antigen of these biomedical research must be enriched the future 'Advances in Food-Security-Sustainability against COVID-19' by identifying and implementing more promising therapeutics to reduce further pandemic complications of SARS-CoV-2 infections in COVID-19. More research on immunomodulation-therapeutic strategies on the certain-mutant-variant-long-coronavirus-2 for the high mortality rate, transmission, and underpins, with the "Legal-Epidemiology" of pandemic-control, is needed.

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