

# Economic okra plant act as a preventive-COVID-19 vaccine advanced horticulture agriculture environment biodiversity conservation science technology communication applications issues

## Abstract

The most 'Economically-Important Number-One Consumption-Vegetable-Crops,' is lost by different pathogens like nematodes, causing the root-knot disease which is definitely controlled by different chemical-pesticides, and on the opposite hand, the pandemic coronavirus 2 (SARS-CoV-2) outbreaks of Coronavirus disease 2019 (COVID-19) have emphasized the vulnerability of human populations to novel viral pressures, causing an emergent global pandemic and badly impacts on horticulture-agriculture-environment health socio-economy medical-pharmaceutical science-technology communication issues. So it's an urgent have to develop potential epidemiological and biomedical preventing COVID-19 vaccines. And India emphasis on okra, the 'Nature's-Gift to Human-Disease-Free-Healthy-Life', and therefore the ultra-high-diluted biomedicines prepared from okra root, applied and confirmed by foliar spray@ 20 ml/plant each group respectively, are highly effective against the root-knot disease of okra, with increasing fresh-plant growth and fruit production. The high-diluted-biomedicines of okra, are simpler than the untreated ones and show the foremost potential confirmed end in all respects. The genetic-effects of ultra-high-diluted-biomedicines thought to induce systemic acquired resistance response of the treated plants through the expression of pathogenesis-related -proteins-genes (22 to 4 numbers), which are more or less similar molecular range (295kD to 11kD) of the many coronaviruses, and it'll to blame for preventing root-knot and COVID-19 like variant-virus diseases by inducing defense-resistance or increasing innate-immunity, with the toxic-free world, and it should help to develop best potential new preventive treatments methods or drug or vaccines, within the field of '21st Century COVID-19 sort of a pandemic within the new normal situation in future, and confirms the "Economic okra Act as a Preventive-COVID-19 Vaccine Advanced Horticulture Agriculture Environment Biodiversity Conservation Science Technology-Communication Applications", and whole plant act as 'Nature's-Gift Preventive-COVID-19 Vaccine for All'.

**Keywords:** okra, preventive-COVID-19-vaccine, advanced-horticulture-agriculture, environment-biodiversity-conservation, science-technology-communication-applications

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## Introduction

**Background of the problems:** The recent coronavirus 2 (SARS-CoV-2), is just one of the nonillions of viruses on our planet, and scientists are rapidly identifying legions of the most recent species that confronting our next National Health Disaster — long-haul Covid-19, and the outbreaks of Coronavirus disease 2019 (COVID-19) pandemic have emphasized the vulnerability of human populations to novel viral pressures and genome variation of worldwide, causing an emergent global pandemic, and it badly impacts on agriculture-environment-health-socio-economy medical-pharmaceutical-science-technology-communication-issues, etc.<sup>1-22</sup>

India emphasis on okra (lady finger) for the 'food security', and it is the most important and crucial aspect of sustainable development in the agricultural sector and the backbone of the economy, and it badly effects or influences of the COVID-19 pandemic on food security, agriculture, massive consequences on health and livelihoods of the developing countries.<sup>23</sup> It is not only reduced incomes, but also disrupted supply chains, chronic and acute hunger due to various factors including conflict, socio-economic conditions, natural hazards, climate change, and pests like the locust which outbreak

compounding this crisis across 23 countries with the other zoonotic diseases remain a recurrent threat.<sup>24</sup> And it is reported that the okra is one the most economically important, commercially exploited, number one consumption in a variety of ways vegetable crops.<sup>25</sup> Okra is the oldest widely cultivated oligo purpose, significantly contribute for nutritional, medicinal and industrial application,<sup>26</sup> and used as traditional medicine, achieving the 'Nature's Gift to human disease-free healthy life' multipurpose crop,<sup>15,19,20,27-29</sup> achieving India first in the world for the fruits rich in vitamins, calcium, folic acid, carbohydrates, phosphorus, magnesium and potassium, iodine, mineral matters, and a good source of superior nutritional quality for human nutrition for preventing different diseases; like cardiovascular disease, type 2 diabetes, kidney diseases, skin infection, digestive diseases, some cancers, antioxidant, nootropic, eye, body immunity, blood pressure, obesity, asthma, constipation, heart disease, sexual health, and neurological disorders, etc., and mature fruit and stems contain crude fiber, used in the paper industry and sugarcane industry.<sup>27-30</sup> The enrich source of nutrients, minerals, and fibers of okra has invited to many pathogens, pests, and diseases infestation,<sup>31</sup> and only the nematode pathogens causing root-knot, damage 10-40% of the total crop production annually, causing serious problems in

our country and this indirectly affects our advanced agronomy-plant-breeding-horticulture-environment socio-economy green-science-technology-communication-issues, and agricultural-economy also. Though the pesticides are very much effective. But it creates several problems in toxicity, pollution, cost-effectiveness, environment-friendliness, and biodiversity conservation.<sup>3-20,27</sup> On the other hand the pesticides block functional first known gene transfer between plants to insects or animals, which is used in the host's defenses mechanism for new pest-control strategies also,<sup>32</sup> and recently in the 31 countries of the globe that higher airborne pollen concentrations correlated with increased SARS-CoV-2 infection rates.<sup>33</sup>

Recently after long lockdowns in Purba Bardhaman, West Bengal, India (Figure 1), only two day shows that the total COVID-19 positive cases are 3847-3849, the total number of discharge cases are 3764-3769, the total number of COVID-19 death is 451-452, rate of recovery is 97.84%-97.92% and rate of mortality is 1.17%-1.17% respectively. So it is an urgent need to find out by developing policy-initiative, cheap, non-phytotoxic, and non-pollutant potential-high-diluted-biomedicines for preventing both the pandemic crisis by improving the agriculture system with the findings and other new research to develop future support and treatments.

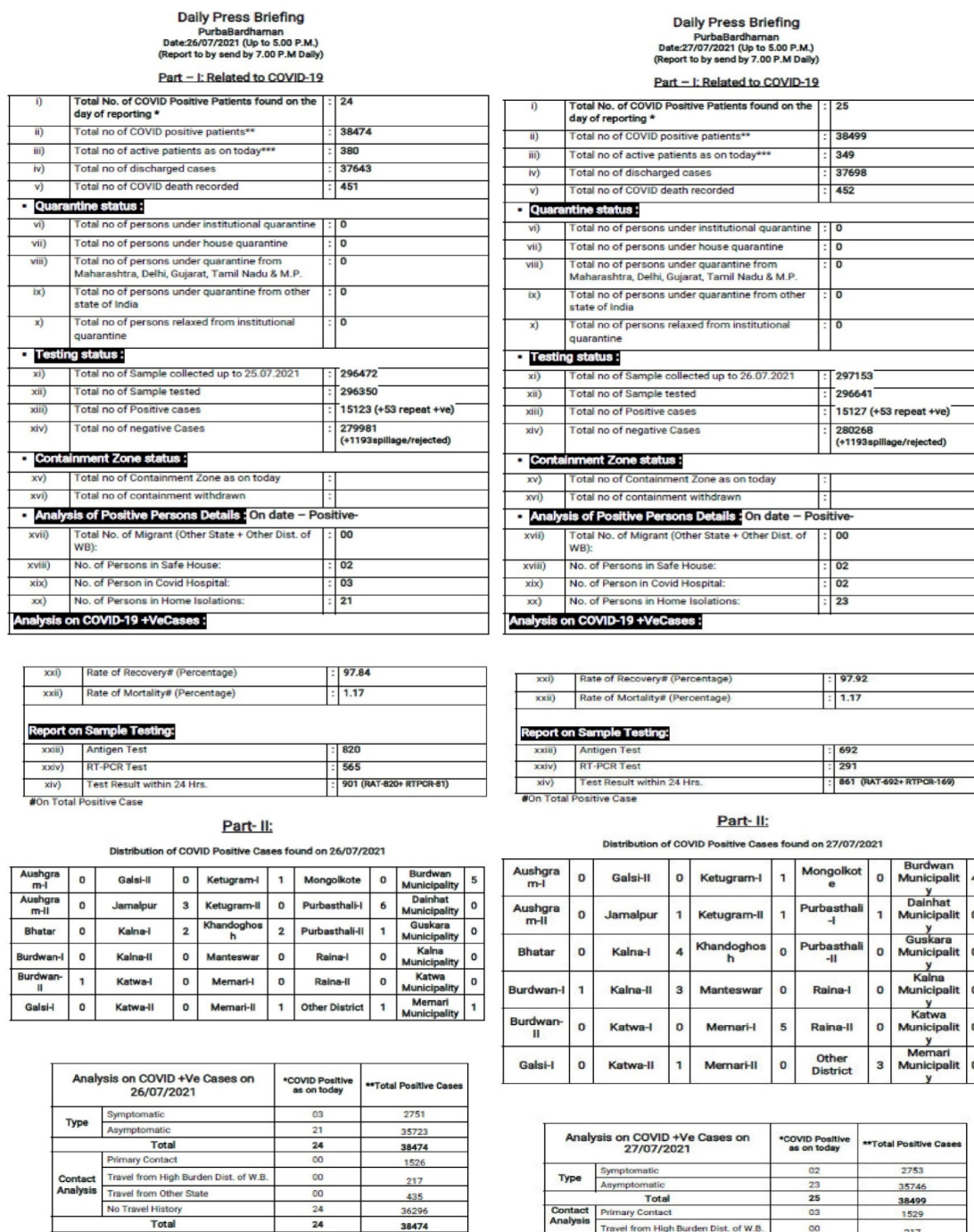


Figure 1 (Part-I&II) Daily Press Briefing of the Purba Bardhaman District (Date:26&27/07/2021, Upto5.00P.M. Daily).

**Work done:** It is already shown that the various; pure compounds, homeopathy, allelopathy, plant extracts, phytomedicine, bio-agents, intercropped-/multi cropped-biomedicines, bio-medicinal-meals, biomedicine-vaccine, social-vaccine, policy-developed global-vaccine, many models, etc. are applied to regulate against different diseases causing pathogens, control the plants- and animal- diseases causing pathogen.<sup>3-20,27,34-63</sup> But it's not achieving potential success all told the cases because of different causes.

It has also been observed recently that the animals- and plants – biomedicines; Nematode Extract (NE) or nematode MT (NMT) and root galls (RG) extract or Gall MT is the safe alternative method to control root-knot diseases caused by nematode pathogens, by inducing their natural defense response of the host plants.<sup>15-20,35-37,39</sup>

**Purpose:** The main objectives of the work significance of the current study is to use the systematic signaling and induced natural defense or immunity in the host plants by applying ultra-high-diluted biomedicines; Gall 30C, Gall 200C, and Gall 100C, prepared from Gall MT (GMT) or gall roots (GR) as a preventive measure against root-knot, and COVID-19 diseases ideas, and also to find out and confirm the actual reasons of the genetic effects on the ultra-high-diluted-biomedicines for preventing diseases.

**Summary of the paper:** The current paper again contributes the development of the most policy-initiative, cheap, non-phytotoxic, non-pollutant, and side-effect free potential-high-diluted-biomedicines global vaccines; Gall 30C, Gall 200C, and Gall 1000C, for controlling both the pandemic crisis; root-knot diseases, and the future-pandemic COVID-19 like virus diseases, by enriching agriculture-environment-health-socio-economy-medical-pharmaceutical-science-technology-communication-issues with the findings and other new research to drug development for the future support and the best treatments or potential preventive vaccine for all.

## Material and methods

**Location and preparation of high-diluted biomedicines Gall MT (GMT):** The high-diluted biomedicines Gall MT (GMT), prepared from the root galls (RG) of okra plants which were collected from roots of the okra plants, *Abelmoschus esculentus* (L.) Moench Cv. Ankur-40, grown in the experimental garden of the Department of Zoology, VisvaBharati University, Santiniketan – 731235, and they were washed with sterile tap water, homogenizer and extracted with 90% ethanol at room temperature (25±2°C) for 15 days and centrifuged at @3500 rpm for 5 minutes, and then the gall extract (GE) supernatant was collected and allowed to evaporate at room temperature (25±2°C) and the biomedicines residues were kept over anhydrous calcium chloride (CaCl<sub>2</sub>) for dehydration and stored at 4°C. The crude GE- biomedicines residue was mixed with sterile distilled water just before application on the test plants. The crude residue was diluted in 90% ethanol at 1mg/ml concentration and was prepared high-diluted biomedicines, Gall MT (Original Solution or Crude Extract i.e. Mother Tincture).<sup>4,7-9,11-20,34-42,47-49,53,54,58,61,63</sup>

**Ultra-high-diluted biomedicines Gall 30, Gall 200C and Gall 1000C preparation:** For the preparation of ultra-high-diluted-biomedicines liquid drugs, the high-diluted GMT was 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 1<sup>st</sup> centesimal potency named Gall 1C. All the subsequent potencies were prepared by further diluting

each potency 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; Gall 30C, Gall 200C, and Gall 1000C, were prepared respectively.<sup>4,7-9,11-20,34-42,47-49,53,54,58,61,63</sup>

**Ultra-high-diluted biomedicines Gall 30, Gall 200C, and Gall 1000C test solutions preparation:** For the preparation of ultra-high-diluted test-solution of the biomedicines; Gall 30C, Gall 200C, and Gall 1000C, were diluted (v/v) @ 1ml drug/20ml sterile distilled water (in the proportion of drug: water=1:20, containing 0.2mg drug) 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 4°C for treatments media.<sup>4,7-9,11-20,34-42,47-49,53,54,58,61,63</sup>

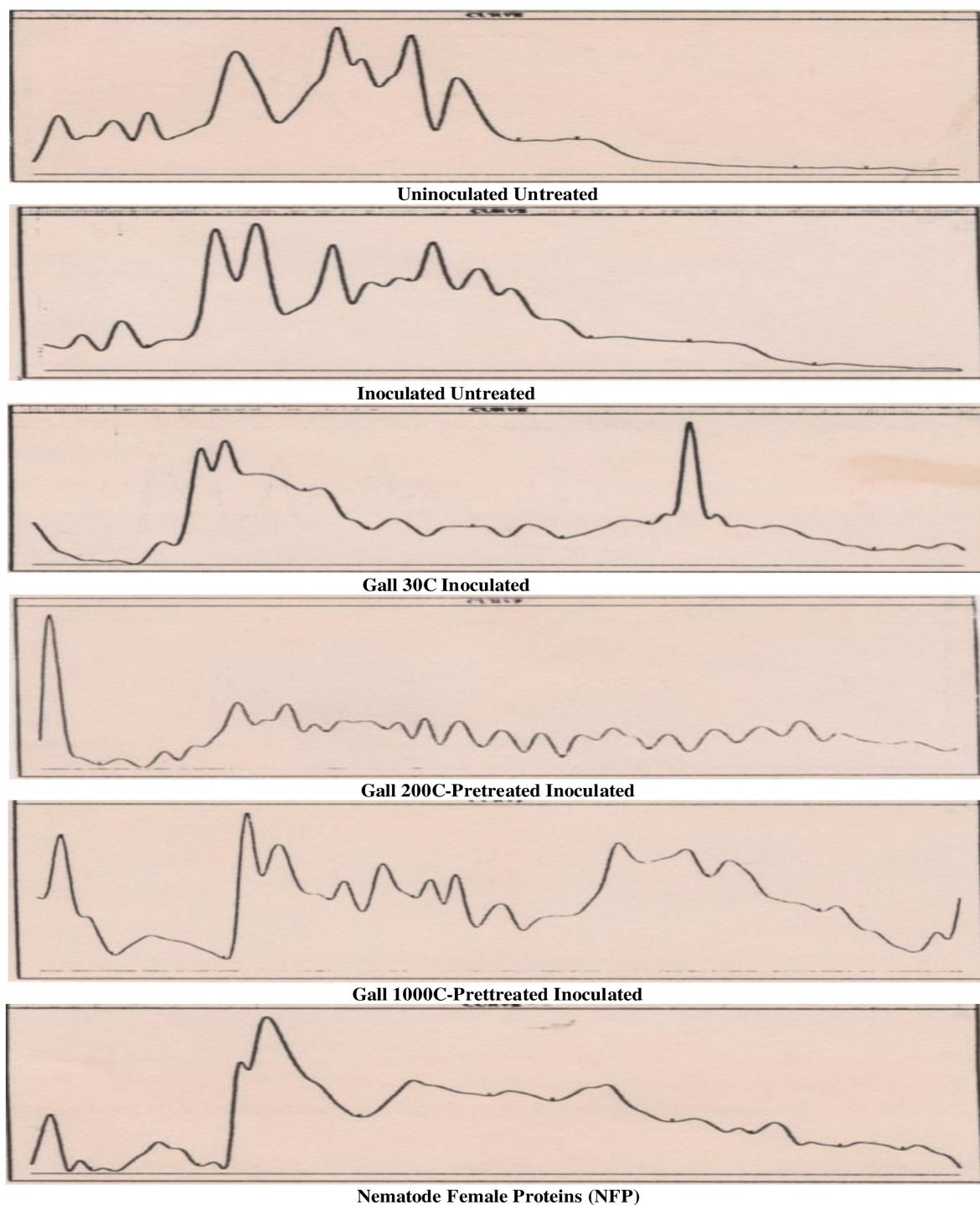
**Pot test and inoculation:** Aseptically germinated seeds of *Abelmoschus esculentus* (L.) Moench Cv. Ankur-40 was sown at the rate of one seed/pot (32 cm diam.) containing a mixture of clay soil and composted manure (2:1 v/v). The soil-filled pots were treated with boiling water 5 (five) times. The pots were divided into four batches/groups; each numbering 10:

- I. uninoculated untreated,
- II. inoculated untreated,
- III. Gall 30C-pretreated inoculated, and
- IV. Gall 200C-pretreated inoculated, and
- V. Gall 1000C-pretreated inoculated. All the pretreatments were done by foliar spray. The experiment was conducted outdoors at an ambient atmospheric temperature (27±2°C) and relative humidity (75±5%). Plants were inoculated at the 12-leaf stage (Day-25) with *M. incognita* (J2) @ 3425±75 J2-larvae/plant.<sup>4,7-9,11-20,34-42,47-49,53,54,58,61,63</sup>

**Treatments with ultra-high-diluted biomedicines Gall 30, Gall 200C, and Gall 1000C test solutions:** The ultra-high-diluted-biomedicines; Gall 30C, Gall 200C, and Gall 1000C -test solutions, were applied into the okra plants and sprayed on plants@20ml/ treated plants three days before inoculation for pretreatments with nematodes-J<sub>2</sub> respectively. Control okra plants were treated with an equal amount (20 ml) of control solutions prepared with sterile distilled water, 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.<sup>4,7-9,11-20,34-42,47-49,53,54,58,61,63-65</sup> All the data were analyzed by ANOVA (Analysis of Variance). The experiment was repeated thrice. Data from the last experiment are reported here.

**Densitometerscanning of okra root (OR), okra root galls (ORG), and nematode –proteins:** The okra root galls (ORG), OR, and nematode female (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.<sup>4,7,15-20,35,39,47-49,53,54,61,63,66</sup>





**Figure 2** Densitometry tracings of root proteins of the Gall 30C, Gall 200C and Gall 1000C-treated okra with nematode proteins resolved on poly acrylamide gel electrophoresis (SDS-PAGE).

**Toxicity:** Biomedicines; Gall 30C, Gall 200C, and Gall 1000C, has exposed directly for the study of toxic effect on nematode juveniles after 2 hours exposure periods at room temperature ( $20 \pm 2^\circ\text{C}$ ).<sup>4,7-9,11-20,34-42,47-49,53,54,58,61,63</sup>

**Harvesting:** All the okra plants were uprooted 53 days after the sowing of seeds. The following measure measurement was taken: biomass of

shoot, root, and fruits, root gall number, nematode population in roots (2g) and soil (200g), the protein content of root and fruits. Proteins were estimated by the Folin-phenol method [64,65]. All the data were analyzed by analysis of variance (ANOVA). The experiment was repeated five times with similar results and the data from the third experiment were represented in Table 1.

**Table 1** Effect of the okra biomedicines Gall 30C, Gall 200C and Gall 1000C-pretreated on okraplants<sup>x</sup> inoculated with root knot nematodes

Treatments <sup>y</sup>	Fresh Biomass (g) <sup>x</sup>			Number of Fruits <sup>x</sup>	Number of Root Galls <sup>x</sup>	Nematode Population <sup>x</sup>		Protein <sup>x</sup> Content (%)		Number of Total Protein
	Shoot	Root	Fruits			Root (2g)	Soil (200g)	Root	Fruits	
I. Uninoculated Untreated	196.28aZ ±10.02	26.58c ±1.22	32.16a ±10.02	22.12b ±1.02	0			1.24d ±0.22	2.26a ±0.02	11
II. Inoculated Untreated	75.01c ±10.01	68.49a ±6.01	13.27c ±4.63	07.31c ±2.01	424.13a ±87.11	718a ±22	31a ±43	2.63a ±0.01	1.12c ±0.02	15
III. Gall 30C-Pretreated Inoculated	184.04b ±1.02	30.31b ±0.09	35.99c ±0.01	24b ±0.02	69b ±1.11	53b ±1.93	54b ±2.02	1.38b ±0.02	1.92c ±0.02	19
IV. Gall 200C-Pretreated Inoculated	194.92a ±2.02	27.10c ±1.02	31.53a ±4.23	25.68a ±2.02	13.07d ±2.31	29d ±13	48c ±24	1.29c ±0.21	2.19b ±0.03	23
V. Gall 1000C-Pretreated Inoculated	179.96b ±2.42	29.22b ±2.04	26.02b ±7.08	24.24b ±1.04	32.01c ±1.03	42c ±12	46c ±24	1.37b ±0.11	1.97b ±0.03	16

<sup>x</sup>-Mean of 10 replicates with S.E

<sup>y</sup>-Okra plants inoculated at 12-leaf stage (Day-25) with *M. incognita* juveniles (3425±75J<sub>2</sub>/pot), pretreated with GMT at 8-leaf stage (Day-22), and harvested 53 days after sowing of germinated seeds

<sup>z</sup>-Means carrying same letters in a column are not significantly different (P≤0.05) by analysis of variance

**In horticulture agriculture environment health-socio-economy-medical-pharmaceutical science-technology communication applications:** The different scientists, academicians, clinicians, scholars, researchers, students, farmers, administrators, institutions, communities, associations, teachers, staff, regulators, photographers, visitors, healthcare, media personnel, Burdwan Green Haunter and Students' Goal-NGO, and different 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 "Prevent okra and COVID-19 diseases for the genetic basis of the ultra-high-diluted-biomedicines; Gall 30C, Gall 200C, and Gall 1000C advancing horticulture agriculture-environment-health-socio-economy-medical-pharmaceutical-science-technology-communication-application"<sup>3-20,34-63</sup>

## Results

**Effect on root-knot (RK) with ultra-high-diluted biomedicines Gall 30, Gall 200C, and Gall 1000C:** The pretreated with ultra-high-diluted-biomedicines; Gall 30, Gall 200C, and Gall 1000C significantly (P≤0.05 by ANOVA) increased plant growth in terms of the fresh biomass of shoot and fruits compared to the inoculated and untreated plants (Table 1). Root galls, nematode population in the root and soil, and root protein content were significantly (P≤0.05 by ANOVA) reduced in pretreated plants as compared to the untreated ones (Table 1). The number of fruits and protein content in green fruit was significantly reduced in inoculated untreated plants as compared to the uninoculated ones, and all the pretreatments with biomedicines; Gall 30, Gall 200C, and Gall 1000C showed better plant growth and lesser intensity of the root-knot disease, and Gall 200C showed the best results in all respect (Table 1).

**Effect on toxicity:** The ultra-high-diluted-biomedicines biomedicines; Gall 30, Gall 200C, and Gall 1000C had not produced any direct toxic effect on nematode because no mortality occurs after 2 hours exposure period.

**Genetic effects of okra root (OR), okra gall root (OGR) and nematodes female's proteins:** Table 2 and Figure 2; shows the genetic effects on molecular weight (kD) of okra root (OR), and okra gall root (OGR) proteins for all pretreatments effects of ultra-high-diluted biomedicines; Gall 30, Gall 200C, and Gall 1000C on *M. incognita* pathogens causing RK-disease of the okra plants. An analysis of root proteins of all 5-groups and nematodesfemale's (NF) proteins by electrophoresis and densitometer scanning of all the test OR and OGR-proteins show that all the ultra-high-diluted biomedicines; Gall 30, Gall 200C, and Gall 1000C-pretreatments resulted in an increased number of proteins in the roots than uninoculated untreated and inoculated untreated groups; the highest number of root proteins in the ultra-high-diluted biomedicines Gall 200C-pretreated inoculated group is 23, and next highest number of the root protein is 19 in the Gall 30C-pretreatment inoculated group, 16 in the Gall 1000C, and 15 in the inoculated untreated group and the lowest number of protein is 11 in the uninoculated untreated group respectively (Table 2 and Figure 2). The highest molecular weight of the OR-protein gene is 295kD and the lowest molecular weight of the OR-protein genes is 11kD. The lowest number of the new pathogenesis-related protein genes (PR-proteins) is 4 in the uninoculated untreated okra roots, and the highest number of the new PR-proteins-genes is 22 in the high-diluted biomedicines- Gall 200C-pretreated okra-pretreatment-group, 18 in the Gall 30C, and the same number i.e. 14 number of PR-proteins-genes is in both the ultra-high-diluted biomedicines Gall 1000C-pretreatment- and inoculated untreated -treatment-group respectively (Table 2 and Figure 2).

And the NF contained 18-proteins-genes and the molecular weight of the NF proteins-genes ranging from the lowest 12kD to the highest 280kD, and the total number of the PR-proteins-genes of NF is 16 in comparison to the uninoculated untreated group (Table 2 and Figure 2).

## Discussion

**On growth:** The present study clearly showed 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 pretreatment groups of OP treated with the ultra-high diluted biomedicines; Gall 30, Gall 200C, and Gall 1000C, but reverse in the fresh biomass of roots of inoculated untreated one.<sup>15-20,35-37,39</sup>

**On root-knot (RK) diseases:** All the pretreatment groups of Ops treated with ultra-high-diluted biomedicines; Gall 30, Gall 200C, and Gall 1000C, decreased RK-diseases in terms of nematode infection in 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 Gall 30, Gall 200C, and Gall 1000C-biomedicines, and minimum with the inoculated untreated group, due to potential ultra-high-diluted effects of biomedicines, and it is also showed that the biomedicines; Gall 30, Gall 200C, and Gall 1000C, might induce synthesis of some antagonistic substance in the treated-OP, which is proved from the inoculated untreated okra root galls (ORG) contained the highest protein-content due to presence of a large number of nematodes.<sup>3-20,34-63</sup>

**On toxicity:** In the recent study is also showed that the high-diluted biomedicines; Gall 30, Gall 200C, and Gall 1000C, had no direct toxic effects on nematodes juveniles, and okra plants, but it induced synthesis of some resistance substances in okra plants to *M. incognita* infection for preventing RK-diseases in the OP, and for these reasons, all the pretreated group had significantly greater fresh biomass of shoot-and fruits- plants than inoculated untreated one.<sup>15-20,35-37,39,67</sup>

**On defense response:** The present experiment showed that the high-diluted biomedicines; Gall 30, Gall 200C, and Gall 1000C, act as really effective preventive biomedicines natural vaccines against plant diseases because of their defense resistance, and it's known that the lectins accumulated in galled regions of the OR- infected with the RK-disease [68]. It's already known that many crop plants will be induced by acquiring systemic resistance for the localized virus-infection or non-pathogenic, and pathogenic-microorganisms or their culture-filtrates or gas or salicylic-acid, etc. protects plants from the numerous pathogens attack, by working systemically.<sup>15-20,35-37,39,67-79</sup>

**On pathogenesis-related (PR) of root proteins-genes:** It is known that the *M. incognita* is known to share common antigens with its host plants,<sup>80</sup> and Iqbal et al. (2020) informed that the attempt to 'Silence Genes' of the root-knot nematode, *M. incognita* results in diverse responses including an increase and no change in expression of some genes. So in the all the treated plant's roots show that the ultra-high-diluted biomedicines; Gall 30, Gall 200C, and Gall 1000C-pretreatments resulted in an increased number of proteins-genes in the root than inoculated untreated-okra plants-group; the highest number of PR-proteins-genes in the ultra-high-diluted biomedicines; Gall 30, Gall 200C, and Gall 1000C-pretreated group is 23, and the next highest number of the PR- protein-gene is 19 in the pretreated-Gall 30C -inoculated group, 16 in the Gall 1000C group, and 15 in the inoculated untreated group, and the lowest number of protein is 11 in the uninoculated untreated group respectively, which proved and confirmed 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 okra root gall (ORG) proteins ranging from 295kD (the highest molecular weight protein) to 11kD (the lowest molecular weight protein) of the OR-protein. And all the ultra-high-diluted pretreated biomedicines; Gall 30, Gall 200C, and Gall 1000C-stimulate the synthesis of the number of different PR-proteins-antigens-genes that must induce defense responses in which the nematodes fail to survive, and 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*.<sup>82-84</sup> 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 (14kD, PR-I) in the sprayed plant-root and leaves, and it sprays enhances-PAL higher activity in infected-ro ots.<sup>15-20,35-37,39,67,77-79,81</sup>

**On pathogenesis-related (PR)-proteins-genes of NF:** The sixteen PR-proteins-genes out of total eighteen proteins-genes of NF of *M. incognita* in comparison to the uninoculated untreated group, and the molecular weight of the nematode-proteins-genes ranging from 12kD to 280kD, already confirmed the potential efficacy of the high-diluted biomedicines-Gall MT or GMT 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 plants due to nematodes present in the gall roots also, and it can be preventing pathogenesis in patients with COVID-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 antiviral-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-die ts".<sup>15-20,35-37,39,67,79,85-88</sup> 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.<sup>89</sup>

**On genetic effects of okra root galls-pathogenesis-related (PR)-proteins-genes:** In the ultra-high-diluted biomedicines-Gall 200C-pretreated okra root galls (ORG), the 22 PR-proteins-genes out of total 23 proteins-genes in comparison to the uninoculated untreated okra plant group, and the molecular weight of the ORGs-proteins-genes ranging from lowest 12.5kD to highest 295kD, proved the potential efficacy of the pretreatment- ultra-high-diluted biomedicines-Gall 200C act as the most effective stimulus for the expression of these many new 22 defense-related PR-proteins-genes which might



be provided resistance to nematode-infection in okra plant. All the ultra-high-diluted biomedicines; Gall 30, Gall 200C, and Gall 1000C-pretreatments collectively resulted in an increased number of PR-proteins-genes. And the genetic effects of ultra-high-diluted biomedicines; Gall 30, Gall 200C, and Gall 1000C-pretreatments resulted in an increased number of proteins-genes, are thought to induce systemic acquired resistance response of all the pretreated plants through the expression of pathogenesis-related (PR)-proteins-genes (22 to 14 numbers), which are more or less similar molecular range (295kD to 11kD) of various coronavirus, and it will responsible for preventing RK and COVID-19 like virus diseases by inducing resistance of plants or increasing immunity of animals respectively, and advanced horticulture agriculture environment health socio-economy medical-pharmaceutical science-technology-communication-application issues.<sup>15-20,35-37,39,67,79,85-89</sup>

**Future suggestions:** The okra ultra-high-diluted biomedicines; Gall30C, Gall 200C, and Gall 1000C-pretreated okra root galls (ORG) protein could be induced the production of new defense-related PR-genes in the test plants and might be confirmed, and in near future, synthetic production of the RG-proteins would be the most potential cost-effective personalized-biomedicine OR social vaccine OR vaccine against coronavirus-2 like pandemic diseases by increasing immunity, and helping policy initiative clinical research in all areas in the field of advanced agronomy-plant-breeding-horticulture-agricultural, aquatic sciences, environment, socio-economy, and green-science-technology-communication issues by preventing okra root-knot and COVID-19 also. Thus, RG-proteins will serve as very effective biomedicines that would be the most effective cheapest, non-phytotoxic, non-pollutant, conserve our biodiversity, and this vaccine might be the most effective against the delta variant of coronavirus, and scholars that give good scope for new development and future research in various fields of pathology-medical-pharmacology preventing fungal infections by increasing the post-COVID weakened lungs as well as the immune also.<sup>15-20,35-37,39,67,90-91</sup> And in the near future ultra-high-diluted biomedicines; Gall30C, Gall 200C, and Gall 1000C pretreatment gall root (GR) may be used as mixing vaccines to provoke potent immune responses for the real-world efficacy and rare side effects.<sup>92</sup> And the Coronavirus 3'-5' exoribonuclease (ExoN), substrate specificity and give insight into the molecular mechanisms of mismatch correction during coronavirus RNA synthesis, provide guidance for the rational design of improved anti-coronavirus therapies, for the future mitigation strategies, and Covid appropriate and risk behavior at slums different areas also.<sup>93-95</sup> It is the most economical plant for the allround benefitted by all and provide also the whole plant act as 'Nature's-Gift Preventive-COVID-19 Vaccine for All'. It also control future 'X-diseases'<sup>96-104</sup> for the 'Few suggestions were made for consideration' due to its cost-effectiveness, eco-friendliness, easily-manufacturability, easily-applicability, easily-availability, and side-effects-freeness, etc.

## Conclusion

The economic plants, okra, the 'Nature's-Gift to Human-Disease-Free-Healthy-Life', and the ultra-high-diluted okra biomedicines, prepared from okra root, the Gall 30C, Gall 200C, and Gall 1000C are highly potent against the diseases, with increasing plant growth and fruit production. The ultra-high-diluted-biomedicines Gall 200C confirms the most potential result in all respects. The genetic-effects of ultra-high-diluted-biomedicines thought to induce systemic acquired resistance response of the treated plants through the expression of pathogenesis-related (PR)-proteins-genes (22 to 4 numbers), which are more or less similar molecular range (295kD to 11kD) of many coronaviruses, and it will be responsible for preventing plant and

COVID-19 like variant-virus diseases by inducing defense-resistance or increasing innate-immunity, and advening horticulture, green-agriculture, environment, global health, socio-economy, medical, pharmaceutical-science, technology, communication- application issues with the toxic-free world, and it may help to develop best potential new preventive treatments methods or drug or vaccines, in the field of '21st Century COVID-19 like a pandemic in the new normal situation in future. And in the near future pretreatment of gall root may be used as mixing vaccines to provoke potent immune responses for the real-world efficacy and rare side effects, with the all-round development and benefitted by all and provide the whole plant act as 'Nature's-Gift Preventive-COVID-19 Vaccine for All also'.

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## Conflicts of interest

The author declares that there is no conflict of interest exists.

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