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Role of Ajan Vruksha/Khandu Chakka Plant (*Ehretia Laevis Roxb.*) in Covid-19 Pandemic

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ABSTRACT

Ehretia Laevis Roxb. plant has many compounds useful in wound healing, fractures, UTI, aphrodisiac, headache, antihelminthics, diuretic, demulcent, expectorant, RTI, fever, fungal infections, hepato-protective, cytotoxic, insecticidal, anti-inflammatory, anti-apoptotic, anti-carcinogenic, weight gain, diabetes, muscles wasting, anti viral activity, preventing viral mutations, blood clotting, reduce the serum lipid level, immunity booster, promotes neural crest cell survival, sedation, anti-Alzheimer, antinociceptive, thyroid uptake promotion, anticoagulant, antiplatelet aggregatory, peptic ulcer, antiasthmatic, antiosteoporotic & antiosteopenic, anticoncataract & ophthalmic effect, decongestant, skin protective, nephroprotective, anti fatigue effect, protection of human sperm, protection of testicular tissue, larvicidal, antimalarial, antiretroviral, cosmetics product, atopic dermatitis, anti fatigue, neuroprotective, retinoprotective, lung tissue protection, heart protection, prevention of splenocyte apoptosis, relieve stress and improve sleep, hepatic encephalopathy, anti-secretory, neurotransmitter, myelin sheath maintenance, gastric acid secretion & regulation, metal ions chelator, anemia, psychiatric disorders, collagen formation, reduce the recurrence, severity, healing period of herpes simplex virus infections, calcium absorption, muscle protein, post surgery recovery, sports injuries, hormones, aging, used in psychotropic drugs.

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INTRODUCTION

Corona Virus Disease (COVID-19) is a contagious disease caused by virus. It causes respiratory symp-

toms such as a dry cough, high fever, sore throat and, difficulty breathing in severe cases. It spreads by coughing, sneezing, personal contact, infected material, mass gatherings; one can avoid infection by regular hand wash, covering of mouth and by maintaining social distance. Cases were reported in Wohan city, Hubei province of china in the month of December 2019. On 7th January 2020 they have confirmed COVID-19 as a causative virus. And on 30th January 2020 WHO authorities declared that the outbreak constitutes a public health emergency of international concerns (PHEIC).

No promising medicine is available for treatment and prevention till. Lot of studies is going on for treatment and prevention. In word near about 1,39,5136 cases are confirmed, 81580 confirmed

deaths till 9th of April 2020 (WHO, 2020). In India 5095 are active cases, 472 cured and 166 total death till 9th April 2020 (WHO, 2020). Lots of efforts are being taken by government for prevention and to stop spread of infections. Traditional medicines are very famous in China and used for COVID-19. Indian government also published advisory by AYUSH department for COVID-19

As Ayurved is Science of life and lots of majors are mentioned in Ayurveda for controlling this Janapadawansa like Dincharya, Ritucharya, majors for building good immune system and medicines to cure diseases. In Maharashtra state of India *Ehretia Laevis Roxb.* plant is being used for many diseases traditionally. Also this is very spiritual plant as Santa Ghyaneshwar Maharaj from Alandi Pune has taken Samadhi at the base of this plant (Admuth, 2016). In this herbal plant, many phytochemicals are available which shows antimicrobial activities including anti viral activities. Also they have antioxidant properties which are useful for building immunity to fight viral infections.

REVIEW OF LITERATURE

Ehretia laevis Roxb. also known as Khandu Chakka and Ajan Vruksha plant has many medicinal useful chemical compounds Table 1.

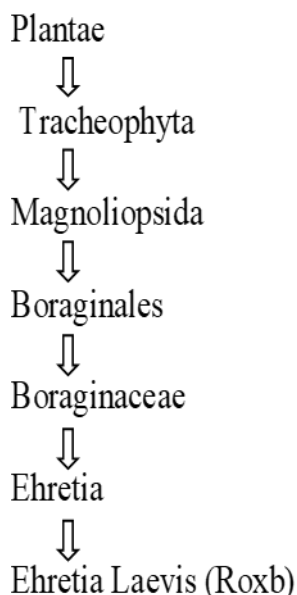


Figure 1: Plant Description

Ehretia laevis is Commonly known as: ovate-leaved ivory wood, Gujarati: Vadhavaradi, Sanskrit: Charma Vruksha Hindi: Bhairi, chamror, Konkani: kalo gamdo, Malayalam: Caranti, Marathi: Datrangi (As it colors teeth in red), Ajan Vruksha (Sant Dnyaneshwar from Alandi Maharashtra India took Samadhi near the base of this tree). leaves ,fruits

and flowers are shown in Figures 2, 3 and 4. Native to: India, Pakistan, Laos, Myanmar, Vietnam, China, Bhutan. In Ayurvedic literature this plant mentioned as Charma Vruksha and useful for *Prameha* (Diabetics) and *Vishaghna* (Anti-Venom) (Moorthy, 2002; Acharya, 2001). This plant is commonly used in joints pain, wound healing, minor fractures by local peoples (Thakre, 2016).



Figure 2: Leaves of Ehretia Laevis Roxb



Figure 3: Fruits of Ehretia Laevis Roxb



Figure 4: Flowers of Ehretia Laevis Roxb

Ajan Vruksha

This is the sacred tree. It is a myth that the root of a plant was touching Gnyaneshwar Maharaj's throat

and was removed by Shree Eknath Maharaj . Pilgrims practice Gnyaneshwari Parayan under Ajan Vruksha plant.

Eknath Maharaj visited to Alandi which is Samadhi place of Sant Gnyaneshwar . Sant Gnyaneshwar Maharaj asked him in his dream to remove the roots of Ajan tree from his neck. Eknath Maharaj located the Samadhi of Sant Gnyaneshwar Maharaj and spotted the Ajan tree near the Samadhi of Sant Gnyaneshwar Maharaj. He went inside the Samadhi place & removed the root ([sadgurus-saints sages, 2020](#)).

Its medicinal properties are used in syphilis and diphtheria, eczema, as an aphrodisiac. Leaves are used to cure ulcers and in headache, anti-helminthics, diuretic, demulcent, expectorant, urine infection, diseases of lungs and decoction of bark is used for gargle in throat infections. Malaria, fever, in fungal infections and has hepato-protective properties ([Thakre, 2016](#)).

Drug has aphrodisiac property like Rasayan and Vajikaran properties mentioned in the ayurveda. Such drugs are always useful for building immunity and acts as an antioxidant. This property of plant may be useful for fighting viral infections and other complications. Also studies shows that maximum deaths are in vulnerable patients. In vulnerable patients we can use this plant for Rasayan and Vajikaran therapy.

Local peoples are using this plant for diphtheria, head ache, demulcent and expectorant and diseases of lungs ([Thakre, 2016](#)). This property of this plant can be useful for infection of respiratory tracts and symptoms of viral infections. As decoction is used for gargles in throat infection hence it can be used for sore throat. Sore throat is one of symptoms in viral infection.

It has very good pain relief activity ([Thakre, 2016](#)). Peoples can use plant leaves with oil for pain relief. It is very beneficial for old peoples suffering from joint pains. It will save the side effects of pain killer medicines and save the money of general public, as income sources are restricted due to lock down.

This plant is also used in malaria and fever ([Thakre, 2016](#)). Recent studies shows that anti malarial drugs are effective in the treatment of COVID-19. This plant may be used for fever in viral infections.

As per Ayurvedic literature this plant is used in Prameha ([Moorthy, 2002](#); [Acharya, 2001](#)). Diabetes is considered as one of the co morbidity in COVID-19. Hence this plant may be used to decrease co morbidity in viral infections. This plant has anti oxidant property ([Velappan and Thangaraj, 2013](#)).

This property is very useful for boosting immunity to fight infections.

Its Hepato protective property will be useful in the side effects of drugs on liver during the treatment of viral infections. Its wound healing property is proven on scientific basis and can be used in wounds to avoids untoward effects of antibiotics ([Thakre, 2016](#)). *Ehretia Laevis Roxb.* plant shows anti microbial activity on *S. aureus*, *E. Coli* ([Thakre and Harne, 2019](#)). *Pseudomonas aeruginos*, salivary microflora ([Deshpandea et al., 2015](#)) *B.subtilis* ([Jyothirmai et al., 2016](#)). This antimicrobial property can be used for secondary infection and associated infections in viral treatment and to maintain general hygiene.

This plant contains many chemicals like,

Naphthoquinone derivative named lewisone, n-octatricontane, baurenol acetate, baurenol, ursolic acid ([Thapliyal and Aggarwal, 2011](#)). Proteins, Lipids, Amino acids, Minerals such as Ca, NH₃, Mg, Na, Fe, Mn, P, Zn, K, Cu and Si, Gallic acid, tannins, rutin, Vit C, decanoic acids, phenylephrine, aconitanes, phthalic acid, phytol, α and β amyryn, piperazine ([Velappan and Thangaraj, 2013](#)).

Benzoquinones

Benzoquinones- 1,4naphthoquinone lewisone, Bauerenol, Bauerenol acetate, α -amyryn, Betulin, Lupeol, Betulinic acid, β -sitosterol ([Li et al., 2010](#)). Dodecane, Tridecene, Tetradecane, n Octylcyclohexane, Tridecanol, Hexadecane, Decyl cyclohexane, Heptadecane, Nonadecane, Tetratetracontane ([Rangnathrao and Shanmugasundaram, 2019](#)), Di-n octyl phthalate ([Ibrahim et al., 2012](#)). Amino acid- Butyric acid, Ornithine, Cysteine, Histidine, Arginine, Serine, Hydroxy proline, Glutamic acid, Proline, Lysine, Tryptamine having various therapeutic properties ([Torane et al., 2009](#)).

2(4H)-Benzofuranone, 5,6,7,7a-tetrahydro-4,4,7a-trimethyl; Propionic acid, 3-(1-hydroxy-2-isopropyl-5-methylcyclohexyl); 3,7,11,15-Tetramethyl-2-hexadecen-1-ol; Hexadecanoic acid, 15-methyl-, methyl ester; Tridecanoic acid; 12,15-Octadecadienoic acid, methyl ester; Methyl 2-hydroxy-octadeca-9,12,15-trienoate; 1,2-15,16-Diepoxyhexadecane; 8,11-Octadecadienoic acid, methyl ester; Methyl 8,11,14-heptadecatrienoate; 5-Chloro-3beta-hydroxy-6beta-nitro-5alpha-androstan-17-one.

Propane, 1,2-dichloro-2-methyl, 1-Chloro-2-ethoxy-2-methoxy-propane, 4-Chloro-2,4-dimethylhexane, Cyclohexasiloxane, dodecamethyl, Cycloheptasiloxane, tetradecamethyl, Phenol, 2,4-bis(1,1-dimethylethyl); Cyclooctasiloxane, hexadecamethyl

; 9,10-Dimethyltricyclo[4.2.1.1(2,5)]decane-9,10-diol ; 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15-hexadecamethyloctasiloxane ; 3,7,11,15-Tetramethyl-2-hexadecen-1-ol ; 9-Eicosyne; 1,2-Benzenedicarboxylic acid, butyloctyl ester ; Phthalic acid, isobutyl octadecyl ester ; Oxirane, hexadecyl-; Methyl 6,10-octadecadienoate ; 9,12,15-Octadecatrienoic acid, (Z,Z,Z)- ; Phthalic acid, octyl 2-propylpentyl ester.

Benzoic acid, 2,6-bis [(trimethylsilyl)oxy]-trimethylsilyl ester ; Silane(pregn-5-ene-3 α ,11 α ,17,20 α -tetracyltetraoxy)tetrakis(trimethyl; (5 α)Pregnane-3,20 α -diol ; 2-Trimethylsiloxy-6-hexadecenoic acid, methyl ester; 4-(Dimethylaminomethyl-5-hydroxybenzofuran-3-yl)(4-methoxyphenyl)methanone ; Chromone, 5-hydroxy-6,7,8-trimethoxy-2,3-dimethyl- ; 6,7-Epoxyregn-4-ene-9,11,18-triol-3,20-dione ; 3,9-Epoxyregn-16-ene-14-18-diol-20-one, 7,11-diacetoxy-3-methoxy- ; 5,8,11,14-Eicosatetraenoic acid, trimethylsilyl ester ; 2,7-Diphenyl-1,6-dioxypyridazino[4,5:2',3']pyrrolo[4',5'-d]pyridazine ; 2,15-Heptadecadiene, 9-(ethoxymethyl) ; Ethyl iso-allocholate; 4-Methoxyphenoxyformamide N-methyl-N-[4-(1-pyrrolidinyl)-2-butynyl] ; Hexadecanoic acid, 14-methyl-, methyl ester; Phthalic acid, butyl oct-3-yl ester; Methyl 9,12-epithio-9,11-octadecanoate ; Methyl 4,7,10,13,16,19-docosahexaenoate ; Z,Z-4,16-Octadecadien-1-ol acetate ; 2,7-Diphenyl-1,6-dioxypyridazino[4,5:2',3'] pyrrolo [4',5'-d]pyridazine (Joshi and Wagh, 2018).

The medicinal uses of above chemicals are mentioned in Table 1.

RESULTS AND DISCUSSION

This Ajan Vruksha plant also known as Khandu Chakka herbal plant, may be useful as antiviral drug and useful in symptom like fever and other associated infections in COVID-19 complications.

This plant has major characteristic of Analgesic, anti arthritic and antinociceptive which is useful in severe body ache, inflammation in viral infection. It has chemical which has antioxidant & anti-apoptotic property which is useful to built immunity in viral infection.

Plant has many such chemicals which are useful in malignancy, obesity, blood sugar, cardio vascular diseases, blood pressure and lipids and muscle wasting to minimise the risk in viral infection, because maximum death in COVID-19 are associated with secondary complications.

Plant has a property to fight infections of fungus and

bacteria which may associate with viral infections. This herbal plant has chemicals which have very good effect on neural diseases like brain ischemia, and useful for promotion of neural crest cell survival, sedative, anticonvulsant, anti-Alzheimer, Anti-seizure , antidepressant , stroke (Rushikesh *et al.*, 2012).

Plant has thyroid uptake promotion property which will be useful for thyroid patients. Anticoagulant, antiplatelet property is useful in old age patients and bedridden patients, also this will reduce the risk in heart patients. Beneficial chemicals to treat the peptic ulcer and cataract are available in this plant. This will help for prevention of diseases (Rushikesh *et al.*, 2016).

Antiasthmatic property may be used for common cold one of the symptom in COVID-19. Antiosteoporotic and antiosteopenic properties are useful for old age patients and rural people as their movements are restricted due to lock down and limited resources.

Chemicals present in this plant act as diuretic, has protective effect on human sperm, protection to testicular tissue, reproduction, useful for kidney and reproductive organs diseases (Santos *et al.*, 2013).

Plant chemical has a property of larvicidal which is useful in malaria. And useful in cosmetics and skin care product, atopic dermatitis, increase immunity, Anti fatigue activity.

Rutin from this plant is responsible for Neuroprotective activity, Retinoprotective, Protective effect on lung tissue hence this will be useful in COVID-19 pandemic. Also it has Cardioprotective , Hepatoprotective, Nephroprotective, Protective effect on blood vasculature, Wound healing property , Radio modulatory effects and help in prevention of splenocyte apoptosis. These properties can be used in associated conditions of the patient.

A chemical from plant is useful in Asthma and can be used in bronchodilator in chest infection. It has antidepressive activity. As many people are in lock down from many days hence there may be chance for depression. To overcome depression this property may be used.

To protect other organs in infection or for maintenance of proper health by its gastro & hepato protective, antipancreatic, anticholytic, anti diabetic & hypolipidemic effects are very useful. It contains piperazine it may be used as Anti-helminthic. Deworming of population is very important to maintain proper health to fight infection. Phenylephrine is available in this plant; hence this plant may be used as a decongestant in flu like symptoms.

Table 1: The medicinal uses of present chemicals

S No	Name of chemical	Medicinal uses
1	Naphthoquinone derivative	antibacterial, antifungal, antiviral, insecticidal, cytotoxic, anti-inflammatory, antipyretic, anti parasite (Babula et al., 2007)
2	1,4-naphthoquinone lewisone	NA
3	n-octatricosane	NA
4	Baurenol acetate	NA
5	Baurenol	analgesic, in swellings (Villaseñor et al., 2004)
6	Ursolic acid	anti-inflammatory, anti-oxidant, anti-apoptotic, cytotoxic, obesity, diabetes mellitus, heart disease, brain & liver disease, muscle wasting (Seo et al., 2018)
7	Minerals such as Na, NH ₃ , Fe, Mn, K, P, Zn, Cu, Si, Mg, Ca,	immune system, antioxidants, antiviral activity, preventing viral mutations (Chaturvedi et al., 2004)
8	Gallic acid	antiviral property (Balachandar et al., 2020)
9	Tannic acid	bacteria ,fungi, yeasts, viruses growth is prohibited by tannins. Clotting of blood, reduce hyper tension, control lipid level, causes liver necrosis, and improve immune responses (Chung et al., 1998)
10	Rutin	anticancer, neuroprotective effect on brain ischemia, improve neural crest cell survival, anticonvulsant, anti-alzheimer, antidepressant , stroke, sedative, analgesic and antiarthritic , analgesic and antinociceptive , Antiarthritic , antifungal, antidiabetic, anti-hypercholesterolemic, thyroid uptake promotion, hypertension, anticoagulant, antiplatelet aggregatory, peptic ulcer, antiasthmatic, antiosteoporotic and antiosteopenic , anticataract and ophthalmic effect Diuretic, protection of human sperm, protection of testicular tissue, anticancer, antibacterial, antifungal, antimycobacterial, larvicidal, antimalarial, antiretroviral, antiviral, anti-apoptotic, cosmetics and skin care product, atopic dermatitis, increase immunity, Anti fatigue activity, neuroprotective activity, retinoprotective, protective of lung tissue, protection of heart , prevention of splenocyte apoptosis, hepatoprotective, nephroprotective, protective effect on blood vasculature, Wound healing, Radio modulatory effects. (Ganeshpurkar and Saluja, 2017)
11	Vitamin C -ascorbic acid	Improve immune system (Wintergerst et al., 2006)
12	Acontanes	NA
13	Decanoic acids	antiseizure (Sills et al., 1986) ,Larvicidal activity (Santos et al., 2017)
14	Phthalic acid	NA

Continued on next page

Table 1 continued

S No	Name of chemical	Medicinal uses
15	Phytol	antinociceptive and Antioxidant (Santos et al., 2017), anticancer and immune-enhancing effects, inhibit cellular senescence (Jeong, 2018), arthritis, asthma, mosquito repellent, useful for malaria (Okie et al., 2009)
16	α and β amyrin	antinociceptive, anticonvulsant, analgesic, in inflammation, depression, hepatic & pancreatic diseases, anticholytic, gastroprotective, anti diabetic & hypolipidemic (Oliveira et al., 2005) microbial, fungal, and viral infections, cancer cells (Rao, 2012)
17	Piperazine	anti-helminthic, antiviral (Aggarwal et al., 2017)
18	Phenylephrine	decongestant (Vardanyan and Hruby, 2006)
19	Betulin & Betulinic acid	antitumor, anti viral, antibacterial, anti-inflammatory, antimalarial (Alakurtti et al., 2006)
20	Lupeol	antiprotozoal, antimicrobial, anti-inflammatory, antitumor and chemo preventive properties (Gallo and Sarachine, 2009). anti-diabetic, cardioprotective, anti-inflammatory, skin protective, hepatoprotective, nephroprotective (Siddique and Saleem, 2011)
21	β -sitosterol	antibacterial, anti-inflammatory, cytotoxic, antifertility, angiogenic, antioxidant, immunity enhancer, antidiabetic, antinociceptive (Ambavade et al., 2014)
22	Dodecane	NA
23	Tridecene	NA
24	Tetradecane	NA
25	Tridecanol	NA
26	Hexadecane	NA
27	Decyl cyclohexane	NA
28	Heptadecane	NA
29	Nonadecane	NA
30	Di - n octyl phthalate	anti venom (Ibrahim et al., 2012)
31	Butyric acid	NA
32	Ornithine	decrease stress and enhance sleep quality related to fatigue (Miyake et al., 2014) Hepatic Encephalopathy (Li et al., 2018)
33	Cysteine	wound healing, antitumor Salas et al. (2008) , Antioxidant, skin-whitening (Sakamoto et al., 2017)

Continued on next page

Table 1 continued

S No	Name of chemical	Medicinal uses
34	Histidine	Precursor for several hormones, anti-inflammatory, anti-oxidant, and anti-secretory functions within the body, neurotransmitter, maintenance of the myelin sheath, gastric acid secretion and regulation, chelator of metal ions like copper, zinc, manganese, and cobalt, anemia (Kessler and Purich, 2019)
35	Serine	psychiatric disorders (de Koning et al., 2003)
36	Hydroxy proline	promotes collagen which maintains the structure and strength of connective tissue like bones, cartilage, blood vessels & skin (Li and Wu, 2018)
37	Glutamic acid	proper metabolism & nervous tissue functions (Weil-Malherbe, 1950)
38	Lysine	Reduce the recurrence, severity, and healing period of herpes simplex virus infections (Chen et al., 2011). Treatment for schizophrenia Wass et al. (2011) Absorption of calcium, building of muscle protein, post surgery recovery ,sports injuries , production of hormones, enzymes, & antibodies, osteoporosis, anxiety and mood disturbances, migraine, alzheimer's dementia, loss of hairs, shingles, malignancy, heart diseases and aging (Singh et al., 2011)
39	Tryptamine	hallucinations, used in psychotropic drugs (Araújo et al., 2015)
40	Hexadecanoic acid	anti-inflammatory (Aparna et al., 2012) , Cytotoxic (Ravi and Krishnan, 2016)
41	12,15-Octadecadienoic acid, methyl ester	Antifungal, Antibacterial, Antimicrobial, Emulsifier, Perfumery Industry (Arora et al., 2017)
42	Cyclohexasiloxane	Cosmetic ingredients (Johnson et al., 2011)
43	Benzoic acid	Expectorant, analgesic, and antiseptic (Lillard, 1904)
44	Ethyl Iso-allocholate	Antimicrobial (Malathi et al., 2016)
45	5,8,11,14-Eicosatetraynoic acid- (Arachidonic acid is an omega-6 fatty acid)	Essential for all cells functions, especially for nervous system, skeletal muscle, & immune system, brain & muscles functions, protection from <i>Schistosoma mansoni</i> and <i>S. haematobium</i> infection , tumor initiation, development, metastasis, swelling & wound healing, heart diseases (Tallima and Ridi, 2018)

This plant contains Lupeol which is skin protective, hence can be used as cosmetic purpose. In Ayurveda this plant is mentioned as Vishagna i.e. anti venom also this plant contains Di - n octyl phthalate which shows anti venom property. Ornithine from this plant may help to decrease stress and enhance sleep quality in the panic situation of COVID-19 pandemic. Hydroxy proline from this plant may help for formation of collagen which is important for normal structure and connective tissue & blood vessels in lack of exercise in lock down situation.

Plant contains Lysine which reduce the recurrence, severity, and healing period of herpes simplex virus infections hence can be used in other viral infection (Sivasankari *et al.*, 2013). Also this is useful in treatment for schizophrenia, absorption of calcium, muscle protein, post surgery recovery, sports injuries, production of hormones, enzymes, antibodies, osteoporosis, anxiety and disturbances of mood, migraine, Alzheimer's dementia, loss of hairs, shingles, malignancy, heart diseases and aging. Tryptamine from this plant causes Hallucinations, used in psychotropic drugs and can be used for needy patients under medical supervision. These properties of Ajan Vruksha also known as Khandu Chakka plant may be useful for the patients in various medical conditions to overcome from COVID-19 pandemic crises, when there is lock down and limited recourses are available nationally and internationally. As this plant shows activity against pathogens and has many chemicals which can be used against pathogens, hence one can do further study to make hand wash as a sanitizer for prevention of disease. This will give employment to the peoples when there are lack of opportunities due to lock down and economical crises.

CONCLUSION

Hence to tackle such situation this herbal plant which is also considered very spiritual plant may help in this critical condition of COVID-19 pandemic by its Anti Viral activity and other medicinal useful activities for co morbidity conditions. These medicinal activities of plant will open the door for further research and will provide good opportunities for employment and farming to strengthen the economy of world. This spiritual plant may pave the way for humanity.

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Conflict of Interest

Nil.

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