



Research article

A survey of medicinal plants of Guadalupe and Floriano regions of Brazil

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ABSTRACT

This survey-based study aimed to explore the native as well as exotic medicinal plants of Canavieira and São Gonçalo do Gurguéia regions of Brazil. Various places including Floriano, Guadalupe, Gurguéia, Canto do Buriti, Canavieira, Monastery of the Catholic Church, etc. Both wild and cultivated plants have been surveyed to collect information on their medicinal and commercial applications. Various well-known medicinal plants including *Phyllanthus amarus*, *Cymbopogon citratus*, *Lippia alba*, *Cassia fistula* and *Corchorus olerius* were recorded in this region. Many plants suitable for large-scale cultivation were also documented during this survey.

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INTRODUCTION

Brazil is known for the highest biodiversity in the world with more than 4000 plant species. This ratio of plant diversity is more than 20% of the total worldwide. Similar to many other parts of the world, the medicinal plants sector is one of the major economy-generating sectors of Brazil (Dutra et al., 2016). However, the international market of Brazilian herbal products is still less than 5%. It has also been reported that only 27% of the plants licensed as active pharmaceutical ingredients in

herbal medicine are native species of Brazil (Carvalho et al., 2018).

MEDICINAL PLANTS SURVEY

Various sites including Floriano, Guadalupe, Gurguéia, Canto do Buriti, Canavieira, and the Monastery of the Catholic Church were visited and information on the medicinal plants was collected. During the survey, sample specimens were also collected for further identification and future records.



Fig. 1. Survey and collection of medicinal plant specimens in Maharishi Vanaushadhi Sarvekshan project in Brazil by the Author (Dr Mayaram Uniyal)

SURVEY OF GUADALUPE AND FLORIANO AREAS OF BRAZIL

A detailed survey of the Guadalupe and Floriano areas was conducted and a total of 115 medicinal plant species

has been recorded out of which 50 species were herbs, 26 were shrubs and 18 were trees. The list of medicinal plants in these areas with botanical names of medicinal plants, local names, Ayurvedic names, and their habitat is given in Table 1.

Table 1. Medicinal Plants found in Guadalupe and Floriano (Tropical Forest zone in Brazil)

S.No.	Botanical name	Type of plant	Ayurvedic name	Brazilian name	Habitat
1.	<i>Phyllanthus niruri</i>	Herb	Bhumayamlaki	Quetra-pedera	Wild
2.	<i>Phyllanthus amarus</i>	Herb	Bhumayamlaki	Quetra-pedera	Wild
3.	<i>Boerhavia diffusa</i>	Herb	Punarnova	Pegapinto	Wild
4.	<i>Annona squamosa</i>	Shrub	Sarifa	Ata, Ateva	Cultivated
5.	<i>Citrus × aurantium</i>	Small tree	Nimbu	Javanja Cidra	Cultivated
6.	<i>Musa paradisiaca</i>	Shrub	Kadali	Banana	Cultivated
7.	<i>Cymbopogon citratus</i>	Herb	Cymimsarto	Bhustrina Capim de burro	Cultivated
8.	<i>Croton campestris</i>	Shrub	Velme	Pinhaorosno	Cultivated
9.	<i>Coleus barbatus</i>	Herb	Vearpurvalli	Malva, boldo	Cultivated
10.	<i>Lippia alba</i>	Shrub	Cidrena	Vashiiva	Cultivated
11.	<i>Coriandrum sativum</i>	Herb	Dharyaka	Coentiso	Cultivated
12.	<i>Allium cepa</i>	Herb	Palandu, Piyaja	Cebota	Cultivated
13.	<i>Mimosa pudica</i>	Herb	Lajavarti	Malisa	Wild
14.	<i>Citrullus vulgaris</i>	Climber	Tarbuja	Melans	Cultivated
15.	<i>Averrhoa carambola</i>	Shrub	Kamraleh	Carambola	Cultivated
16.	<i>Carica Papaya</i>	Small tree	Papaya, Pipita	Mamaeiro	Cultivated
17.	<i>Anacardium othonianum</i>	Tree	Occidentale	Kaju	Cultivated
18.	<i>Mangifera indica</i>	Tree	Amra	Mangueria	Cultivated
19.	<i>Corchorus olitorius</i>	Herb	Chanchu	Juta	Wild
20.	<i>Portulaca oleracea</i>	Herb	Lonika	Alecrim de Sao Jose Hortela	Wild
21.	<i>Cassia fistula</i>	Small tree	Amaltas	Canaforra Geira	Cultivated
22.	<i>Cassia tora</i>	Herb	Chakarimarda	Candeio	Wild
23.	<i>Calotropis procera</i>	Shrub	Arka	Madar	Wild
24.	<i>Ricinus communis</i>	Shrub	Erenda	Mamona	Wild
25.	<i>Oxalis comiculata</i>	Herb	Changari	-	Wild
26.	<i>Tamarix dioica</i>	Small tree	Jhau	-	Cultivated
27.	<i>Tamarindus indica</i>	Tree	Tintrini, Imli	Tamarindo	Cultivated
28.	<i>Albizia lebbek</i>	Tree	Shirisha	-	Wild
29.	<i>Euphorbia hirta</i>	Herb	Dugorlika (Bari)	-	Wild
30.	<i>Euphorbia thymifolia</i>	Herb	Sugothika ehhoti	-	Wild
31.	<i>Euphorbia weberbaueri</i>	Small tree	Snuhi	-	Wild
32.	<i>Tylophora asthmatica</i>	Climber	Arkapami	-	Wild
33.	<i>Tribulus terrestris</i>	Herb	Gokharu	-	Wild
34.	<i>Sida cordifolia</i>	Herb	Gokharu	Malva	Wild
35.	<i>Sida spinosa</i>	Herb	Bala	Malva	Wild
36.	<i>Solanum xanthocarpum</i>	Shrub	Kantakari	-	Wild
37.	<i>Solanum surattense</i>	Shrub	Kantakari Buri	-	Wild
38.	<i>Crotalaria juncea</i>	Herb	Shanpuspi	Gergelim-Bravo	Wild
39.	<i>Crotalaria mucronata</i>	Herb	Shanpuspi	Gergelim-Bravo	Wild
40.	<i>Nerium indicum</i>	Shrub	Kanar, Karvira	Espirra-deira	Cultivated
41.	<i>Amaranthus spinosus</i>	Herb	Kanta-chauli	Bredo de Espinho	Cultivated
42.	<i>Momordica charantia</i>	Climber	Kerela Jangli	Melancia	Wild
43.	<i>Mentha × piperita</i>	Herb	Mint	Hortela	Cultivated
44.	<i>Mentha arvensis</i>	Herb	Pudeena	Mint	Cultivated
45.	<i>Bambusa bambos</i>	Shrub	Vansh. Bans.	Bambu	Cultivated
46.	<i>Heliotropium indicum</i>	Herb	Hastisundi		Wild
47.	<i>Cucurbita maxima</i>	Climber	Seetaphal, Meetha Kadu, Abobora	-	Cultivated
48.	<i>Cucurbita moschata</i>	Climber	Kadu, Abobora		Cultivated
49.	<i>Rosmarinus officinalis</i>	Herb	Rusmari	Aleirim	Wild
50.	<i>Lactuca sativa</i>	Herb	Kahubhed	Alface	Wild

51.	<i>Lactuca esculenta</i>	Herb	Kahubhed	Alface	Wild
52.	<i>Ocimum gratissimum</i>	Herb	Ramtulsi	Alfavaca	Cultivated
53.	<i>Ocimum tenuiflorum</i>	Herb	Tulsi	Alfavaca	Cultivated
54.	<i>Ocimum basilicum</i>	Herb	Kali Tulsi	Alfavaca	Cultivated
55.	<i>Ocimum pilosum</i>	Herb	-	Alfavaca	Cultivated
56.	<i>Gossypium hirsutum</i>	Herb	Vankapasi	Alogodao	Wild
57.	<i>Allium sativum</i>	Herb	Lasuna	Alho	Cultivated
58.	<i>Ruta graveolens</i>	Herb	Hermal	Arruda	Cultivated
59.	<i>Aloe vera</i>	Herb	Gharitakumari	Babosa	Cultivated
60.	<i>Operculina turpethum</i>	Climber	Hishoth-Bhed	Batata de purge	Wild
61.	<i>Operculina macrocarpa</i>	Climber	Hishoth-Bhed	Batata de purge	Wild
62.	<i>Vernonia condensata</i>	Shrub	-	Boldo-de-Goias	Wild
63.	<i>Vernonia bahiensis</i>	Shrub	-	Boldo-de-Goias	Wild
64.	<i>Copaifera officinalis</i>	Shrub	-	Boldo-de-Goias	Wild
65.	<i>Symphytum peregrinum</i>	Shrub	-	Confrei	Wild
66.	<i>Melissa officinalis</i>	Shrub	-	Evvadoca	Wild
67.	<i>Foeniculum vulgare</i>	Herb	Saunf	Evva-doce, funcro	Cultivated
68.	<i>Hibiscus rosa-sinensis</i>	Shrub	Gurhal	Hibicus	Cultivated
69.	<i>Eucalyptus globulus</i>	Tree	Neelgiri	Eucalipto	Cultivated
70.	<i>Cassia occidentalis</i>	Shrub	Kasmavda	Fedegosa	Wild
71.	<i>Cassia geminiflora</i>	Shrub	Kasaundi Bhed	Fedegosa	Cultivated
72.	<i>Zingiber officinale</i>	Herb	Adarakh	Gengiber	Cultivated
73.	<i>Amomum zingiber</i>	Herb	Adarkh	Gengiber	Cultivated
74.	<i>Helianthus annuus</i>	Herb	Sujajamukhi	Girassol	Cultivated
75.	<i>Helianthus lenticularis</i>	Herb	Sujajamukhi	Girassol	Cultivated
76.	<i>Psidium guajava</i>	Shrub or small tree	Amrud	Goiatbeira	Cultivated
77.	<i>Tabebuia impetiginosa</i>	Small tree	Rohitak Bhed	Ipe	Wild
78.	<i>Caesalpinia ferrea</i>	Shrub	Kantakannga	Juca	Wild
79.	<i>Citrus sinensis</i>	Shrub	Nimbuka	Lavanjeira	Cultivated
80.	<i>Citrus × aurantium</i>	Tree	Var Amara Nimbu	Laranja	Cultivated
81.	<i>Citrus × limonia</i>	Tree	Bara Nimbu	Limbao	Cultivated
82.	<i>Malva parviflora</i>	Shrub, large Herb	Panivka	Malva	Wild
83.	<i>Passiflora alata</i>	Climber	-	Marcuja (Fruit is stimulant and tonic in Brazil)	Wild
84.	<i>Chenopodium ambrosioides</i>	Herb, aromatic	Sugadh-Vasruta	Mastruco	Wild
85.	<i>Chenopodium anthelminticum</i>	Herb, aromatic	Sugadh-Vasruta	Mastruco	Wild
86.	<i>Zea mays</i>	-	Make	Roma	Cultivated
87.	<i>Punica granatum</i>	Shrub	Dodima	Roma	Cultivated
88.	<i>Cymbopogon schoenanthus</i>	-	Roshisha	Copin-Santo	Wild
89.	<i>Allium ascalonicum</i>	-	-	Cebola-branch	Cultivated
90.	<i>Sambucus australis</i>	-	-	Sabugueiro	Wild
91.	<i>Commiphora abyssinica</i>	Tree	Guggalu Bhed	Berg	Wild
92.	<i>Boswellia carteri</i>	-	Salaie bhed	Birdev	Wild
93.	<i>Opopanax chironium</i>	-	-	-	Wild
94.	<i>Protium heptaphyllum</i>	Tree	-	Almecega (regional plant)	Wild
95.	<i>Ageratum conyzoides</i>	Herb	Jangalipudena	Mentrasto	Wild
96.	<i>Bidens bipinnata</i>	Herb	Kuri	Carrapicho	Wild
97.	<i>Tagetes minuta</i>	Herb	Genda	Carvo-de-Dufento	Cultivated
98.	<i>Wedelia scaberrima</i>	Herb	Peetbhangara	Cemarade Flexa	Wild
99.	<i>Hyptis brevipes</i>	-	Gandhatulsi	Alecrimde Tabulerio	Wild
100.	<i>Hyptis mutabilis</i>	-	Gandhatulsi	Samabacaita	Wild
101.	<i>Cedrela fissilis</i>	Tree	Tuna	Cedro-de-Vicosa	Wild
102.	<i>Piper umbellatum</i>	-	-	Capeba	Wild
103.	<i>Lantana camara</i>	-	Lantana	Camara-chumbinho	Wild
104.	<i>Pilocarpus jaborandi</i>	-	-	Jobovandi	Wild
105.	<i>Abrus precatorius</i>	Climber	Gunja, Roti	Ciume	Wild
106.	<i>Jatropha curcas</i>	Shrub	Dribanti, Ratanjot	Pinhao-Branco	Cultivated

107.	<i>Syzygium jambolanum</i>	Tree	Jamun	Jumbo	Cultivated
108.	<i>Sesamum indicum</i>	Herb	Til	Berbeim-Branca	Wild
109.	<i>Cleome viscosa</i>	Herb	Hurhur	Mudgambe	Wild
110.	<i>Cynodon dactylon</i>	Herb	Dubra	-	Wild
111.	<i>Cocos nucifera</i>	Tree	Naiyal	-	Cultivated
112.	<i>Ananas comosus</i>	Tree	Aananas	Pine Apple	Cultivated
113.	<i>Vitex negundo</i>	Shrub	Nirgundi	Sporadu	Cultivated
114.	<i>Vinca rosea</i>	Herb	Sadabahor	-	Cultivated
115.	<i>Saccharum officinarum</i>	Herb or small shrub	Ganna	Sugarcane	Cultivated

PLANTS SELLING IN THE LOCAL MARKET

Various plants were seen in the Guadalupe market which were selling as herbal medicine and as spices. In

addition, the plants used in medicines prepared by the Nun at the Monastery near Floriano (the Monastery also produces honey) were also recorded. Such selected important plants are given in Tables 2 and 3.

Table 2. Plants in the Guadalupe market are being sold as local herbs, medicines and spices

S.No.	Brazilian name	Ayurvedic/Hindi name	Botanical name
1.	Clovae	Lavanga	<i>Syzygium aromaticum</i>
2.	Erva-doce	Saunf	<i>Foeniculum vulgare</i>
3.	Coentro	Dhaniya	<i>Coriandrum sativum</i>
4.	Louro	Patra	<i>Cinnamomum camphora</i>
5.	Sena	Sanaya	<i>Cassia angustifolia</i>
6.	Eucalyptus	Neelgiri	<i>Eucalyptus globulus</i>
7.	Mojtarda	Sarca kali	<i>Brassica campestris</i>
8.	Agafrao	Haldi	<i>Curcuma longa</i>
9.	Cebola	Palandu	<i>Allium cepa</i>
10.	Pepind	Kheera	<i>Cucumis sativus</i>
11.	Melao	Kharbuja	<i>Cucumis melo</i>
12.	Pimentao	Shimalamirch	<i>Capsicum annum</i>

Table 3. Plants used in medicines prepared by Nun at Monastery near Floriano

S.No.	Plant	Known uses
1.	Copiba heny Agriao Sueupira Xarope-Paracripe Cha Deirrame (Xilma)	Medicine for inflammation
2.	Pau Darco Poxo Mmeixa Jotoba	Blood disorders and oedema
3.	Banana Mint (Pudena) Matrux Passau, Hony or heny	Used for anthelmintic and abdomen worms
4.	Roma	Throat inflammation
5.	Tincharjuca (Pao Feno)	External use for ulcer healing
6.	Quebra Pedra	The whole plant is used as a diuretic, genitourinary tract infection, stomachic, diabetes and remedy for jaundice

CULTIVATION OF INDIAN MEDICINAL PLANTS IN BRAZIL

During the survey, some cultivated plants were recorded in Maharishi Ayurveda Vanaushadhi Vatika which were brought from India to Brazil. Based on this

observation, it can be recommended that many Indian plants can also grow in Brazil. Among them, some important plants are the Neem tree (*Azadirachta indica*), Haritaki (*Terminalia chebula*), Ashoka tree (*Saraca indica*) and Bhumyamalaki (*Phyllanthus niruri*). A list of such plants is given in Table 4.

Table 4. Plants to bring from India for cultivation in Brazil

S.No.	Ayurvedic name	English name	Botanical name	Part of cultivation
1.	Nimba/Neem	Neem Indian	<i>Azadirachta indica</i>	Seed
2.	Amaltas	Moraya-Bltan	<i>Cassia fistula</i>	Seed
3.	Haritaki/Harad	Moraya-Bltan	<i>Terminalia chebula</i>	Seed
4.	Bibhitak/Baheja	Moraya-Bltan	<i>Terminalia bellirica</i>	Seed
5.	Amilki/Amala	Moraya-Bltan	<i>Embllica officinalis</i>	Seed
6.	Ashok	Indian tree	<i>Saraca indica</i>	Seed
7.	Arjuna	Terminalia	<i>Terminalia arjuna</i>	Seed
8.	Kachar	Teneena	<i>Bauhinia variegata</i>	Seed
9.	Varuna	Three leaved caper	<i>Crataeva nurvala</i>	Seed
10.	Sahanjan	Moringa	<i>Moringa oleifera</i>	Seed
11.	Chanalal	Sandalseed	<i>Pterocarpus santalinus</i>	Seed
12.	Bilva	Stone apple	<i>Aegle marmelos</i>	Seed
13.	Shyonaka	Indian trumpet tree	<i>Oroxylum indicum</i>	Seed
14.	Gambhari	Beechwood	<i>Gmelina arborea</i>	Seed
15.	Shatavari	Asparagus	<i>Asparagus racemosus</i>	Seed tuber
16.	Ghritkumari	Aloe	<i>Aloe vera</i>	Cutting
17.	Sarpagandha	Indian Snakeroot	<i>Rauwolfia serpentina</i>	Seed Cutting
18.	Sanaya	Senna	<i>Cassia angustifolia</i>	Seed
19.	Pappament	Peppermint	<i>Mentha × piperita</i>	Cutting
20.	Pudena	Mint	<i>Mentha arvensis</i>	Cutting
21.	Latakasturi	Musk seed	<i>Hibiscus abelmoschus</i>	Seed
22.	Adusa	Vasaka	<i>Adhatoda vasica</i>	Seed
23.	Mulathi	Licorice	<i>Glycyrrhiza glabra</i>	Cutting
24.	Ashvagandha	Indian Winter cherry	<i>Withania somnifera</i>	Seed
25.	Mirgundi	Vitex	<i>Vitex negundo</i>	Cutting Seed
26.	Bhumiyamalaki	Quebra pederá	<i>Phyllanthus niruri</i>	Seed

MEDICINAL USES OF PLANTS FOUND IN GUADALUPE AND FLORIANO AREAS

These plants are used for various health problems including gastrointestinal, respiratory, hepatic, pulmonary,

renal, skin and eye-related problems. Some plants are used as tonic while some are used in pain and inflammation. In addition, cosmetic use of some plants was also recorded. Some of these important medicinal plants with their key applications are given in Tables 5 and 6.

Table 5. Uses of medicinal plants found on Guadalupe

S.No.	Brazilian name	Part used	Application
1.	Manjirioba ou Fedegoso	Seeds	Tea of seeds for digestion and roasted seeds for tonic
2.	Pega Pinto	Roots	Inflammation in uterus
3.	Quebra Pedra de Rama	Leaves and branch	Tea of leaves and branch for kidney
4.	Quebra Pedra	Roots and leaves	Tea of root and leaves for kidney
5.	Crista de Galo	Roots	Menstruation
6.	Pau de Terra da Folha Larga	Bark	Bark for digestion (to use the part between bark and stalk)
7.	Batata de Teu	Roots	Tea of roots for the bite of snakes
8.	Maracuja do Mato ou Maracuja Bravo	Whole plant	All the plants for sedative and decrease blood pressure
9.	Velame Bravo	Leaves	Oil of the leaves for the cosmetic industry
10.	Fava Danta	Fruit	Fruit used in glaucoma
11.	Grao de Galo	Roots	Tea of the roots is good for pneumonia
12.	Acoita Cavalo	Bark	Women's inflammation-bark of stalk
13.	Malva Branca	Roots	Roots for cold
14.	Caatinga de Porco (=stink of pig!)	Bark and leaves	Bark and leaves for digestion (very strong)
15.	Pau de Leite	Bark	Bark's milk for ulcer and cold (cold infusion)
16.	Channa ou Postaneria	Syrup	Syrup for cold; Cold infusion for inflammation
17.	Vassourinha de Botao	-	Used as a cold infusion with mother's milk for digestion
18.	Pau de Terre da Folha Large	Bark	Cold infusion of bark for wind and digestion

19.	Candeia	Bark	Cold infusion of bark, and also powder of bark to heal.
20.	Jenipapinho	Bark	Scrape the bark and to cataplasm for broken bones
21.	Manaca	Bark and roots	Cold infusion of bark and roots for anaemia
22.	Catarema	Bark	Cold infusion of bark for intestinal colic
23.	Araca	Bark	Powder of bark to heal
24.	Sambaiba	-	Cold infusion of bark for tonic and women's inflammation
25.	Olho de Boi	Bark	Cold infusion of bark for wind and digestion
26.	Amargoso	Bark	Syrup of bark for cold and catarrh
27.	Erva de passarinho ou Enxerto	Whole plant	Whole plant used for heart diseases
28.	Mangabeira	Bark and leaves	Cold infusion of bark and tea of the leaves for liver and kidney
29.	Orclha de onca (Pau d'Arco)	Bark	Powder of bark to heal
30.	Berdoega	Stalk, flowers, leaves	Syrup of stalk, flowers and leaves for colds; Stalk, flowers, and leaves to put in food
31.	Tucum Rasteiro (like snake)	-	We can eat the small, inside coconut.
32.	Pau D'Arco-Branch	Bark	Powder of bark to heal; Cold infusion of bark for ulcer and gastric
33.	Tingui	Whole plant	The whole plant is poisonous and provokes abortion
34.	Copaiba, Pau D'Oleo	Juice	Juice of plants is an oil to heals, antibacterial; with honey is good for throat inflammation.
35.	Bamburral	Flowers and leaves	Syrup of flowers and leaves for cold
36.	Cansacao Branca ou	Bark leaves and stem	Bark infusion for internal inflammation and ovarian cancer; Leaves and stems with thorns "to beat" in the skin to reduce internal fever
37.	Jambo	Leaves	Leaves tea is anti-diabetic
38.	Juca	Bark	Bark and faba (green bean) are good to heal.
39.	Erva Cidreira do mato	Leaves, flowers	Tea of leaves and flowers is soothing
40.	Pinhao Branco	Seeds	Tea with roasted seeds for chronic sinusitis
41.	Pau de Rato	Leaves, flowers	Tea of leaves and flowers for intestinal colic in a child
42.	Jua	Leaves, bark	Cold infusion of leaves to make shampoo and to clean the skin. It is also good for lice; Powder of bark is good to brush teeth and also to make shampoo for hair and soap.
43.	Bredo Verdadeiro	Leaves, flowers Leaves	Syrup with leaves and flowers for cold; Used leaves to make salad= rich in vitamins.

Table 5. Uses of medicinal plants found on Floriano

S.No.	Brazilian name	Part used	Application
1.	Jaborandi	Leaves	Leaves are used in the Pharmaceutical industry for anaesthetic and glaucoma
2.	Fedegoso	Flowers Seeds	Syrup of flowers for cold; Roasted and crushed seeds for tonic.
3.	Urucum	-	Used for colour in food and also for the cosmetic industry (suntan lotion)
4.	Ameixa do Mato	Bark	Scrapings of bark for internal inflammation
5.	Rana de Bezerra/Argeria	-	Used as fodder for animals
6.	Grao de Gola	Fruit	We can eat the fruit.
7.	Angico de Bezerra	Bark	Cold infusion of bark for inflammation; Powder of bark for wound
8.	Marmeleiro	Leaves	Essential oil of leaves for the pharmaceutical industry
9.	Acoita cavalo	Leaves, bark	Tea of leaves for digestion; Cold infusion of bark inflammation

CONCLUSION

The present survey was conducted in some areas of Brazil which revealed the occurrence of a variety of

medicinal plants used in various human ailments. Many industrially important plants were cultivated in these areas. A thorough survey of Brazil is needed to explore all plant species to collect information on their medicinal uses.

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CONFLICTS OF INTEREST

The author(s) declare(s) no conflicts of interest.

DECLARATION

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