

# Home Gardens

## Fruit and Nut Trees

**Table 1: Fungicides available for disease management for home fruit and nut production.**

Chemical	Product Name	Type of Fungicide	Crops	Diseases Controlled	Comments
calcium polysulfides	Hi-Yield Improved Lime Sulfur Spray	Contact	Most fruits, do not use on apricots	Anthrachnose, brown rot, leaf curl, leaf spot, mummy berry, powdery mildew, rust, scab and shot hole	Highly toxic. Do not apply when temperatures exceed 85 F. Do not apply with oil or near the time of an oil application.
captan	Bonide Captan 50WP, Hi-Yield Captan 50W Fungicide	Contact	Apples, apricots, blueberries, cherries, grapes, nectarines, peaches, plums and strawberries	Bitter rot, black rot, Botrytis rot, brown rot, cedar-apple rust, downy mildew, fly-speck, forg-eye, fruit rots and spots, leaf spots, mummy berry, quince rust, scab and sooty blotch	Bonide Captan 50 WP can be used on blackberries for anthracnose and Botrytis gray mold.
captan + insecticides	Bonide A Complete Fruit Tree Spray Concentrate, Godon's Liquid Fruit Tree Spray, Martin's Rescue One Spray Protection	Contact	Apples, apricots, cherries, grapes, nectarines, peaches, plums and strawberries	Bitter rot, black rot, Botrytis rot, brown rot, cedar-apple rust, downy mildew, fly-speck, forg-eye, fruit rots and spots, leaf spots, quince rust, scab and sooty blotch	None
chlorothalonil	Bonide Fung-onil Multi-purpose Fungicide <sup>1</sup> , Ferti-lome Broad Spectrum Landscape and Garden Fungicide <sup>1</sup> , GardenTech Daconil Fungicide <sup>1</sup> , Gordon's Multi-Purpose Fungicide, Hi-Yield Vegetable, Flower, Fruit and Ornamental Fungicide and Ortho Max Garden Disease Control Concentrate	Contact	Apricots, blueberries, cherries, nectarines, peaches, plums and prunes	Anthrachnose, brown rot (blossom and twig blights), cherry leaf spot, leaf curl, mummy berry, scab and shot hole	None
copper	Bonide Copper Spray or Dust, Bonide Liquid Copper Fungicide <sup>1</sup> , Concern Copper Soap Fungicide, Gordon's Bordeaux Mixture, Hi-Yield Bordeaux Mix Fungicide, Hi-Yield Copper Fungicide, Lilly Miller Cueva Copper Soap Fungicide	Contact	Apples, apricots, berries, cherries, citrus, grapes, nectarines, peaches, pears, pecans, plums, prunes, quince and strawberries	Angular leaf spot, anthracnose, bacterial canker, bacterial leaf spot, bitter rot, black rot, blotch, brown rot, can cankers, cedar-apple rust, downy mildew, fire blight, fruit spots, gray mold, leaf blights, leaf curl, leaf scorch, leaf spot, melanose, powdery mildew, quince rust, leaf curl, scab and shot hole	Do not apply after shuck split or before harvest on stone fruits. Do not apply after early bloom on blueberries.
copper + insecticides	Bonide Garden Dust and Bonide Dragoon Dust with Copper	Contact	Apples, apricots, berries, cherries, citrus, grapes, nectarines, peaches, pears, pecans, plums, prunes, quince and strawberries	Angular leaf spot, anthracnose, bacterial canker, bacterial leaf spot, bitter rot, black rot, blotch, brown rot, can cankers, cedar-apple rust, downy mildew, fire blight, fruit spots, gray mold, leaf blights, leaf curl, leaf scorch, leaf spot, melanose, powdery mildew, quince rust, leaf curl, scab and shot hole	None

Chemical	Product Name	Type of Fungicide	Crops	Diseases Controlled	Comments
mancozeb	Bonide Mancozeb Flowable with Zinc Concentrate	Contact	Grapes	Black rot, bunch rot, Eutypa dieback (formerly known as dead arm) and downy mildew	None
myclobutanil	Eagle 20EW, Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate	Systemic	Apples, apricots, cherries, grapes, nectarines, peaches, plums and prunes	Anthracnose, black rot, brown rot, powdery mildew, rust, scab and shot hole	None
neem oil	Bonide Rose Rx 3 in 1 <sup>1</sup> , Bonide Tomato and Vegetable 3 in 1, Concern Garden Defense Multi-Purpose Spray <sup>1</sup> , Ferti-lome Rose, Flower and Vegetable Spray, Bardens Alive! Shield-All II, Garden Safe Fungicide 3-in-1 <sup>1</sup> , Green Light Neem Concentrate, Green Light Powdery Mildew Killer RTU, Natural Guard Neem Py, Southern Ag Triple Action Neem Oil	Contact	All fruits	Anthracnose, black rot, Botrytis blight, downy mildew, fungal leaf spots, powdery mildew, rust and scab	None
neem oil + insecticides	Ferti-lome Triple Action Plus <sup>1</sup> , Green Light Neem <sup>11</sup> Ready-To-Use	Contact	All fruits and nuts	Anthracnose, Botrytis, downy mildew, fungal leaf spots and blights, powdery mildew, rust and scab	None
phosphorus acid	Monterey Garden-Fos Systemic Fungicide	Systemic	Apples, berries, citrus, grapes, loquats, pears, quince, stone fruits and strawberries	Apple scab, downy mildew, fire blight and root and collar and fruit rots caused by <i>Photophthora</i> spp.	None
potassium carbonate	Garden-ville Potassium Bicarbonate	Contact	All fruits	Powdery mildew	None
propiconazole	Bonide Infuse Systemic Disease Control, Ferti-lome Liquid Systemic Fungicide II, Gordon's Systemic Fungicide	Systemic	Apples, citrus, pecans and walnuts	Anthracnose, fungal leaf spots, powdery mildew, rust and scab	None
propiconazole	Bonide Infuse Systemic Disease Control, Bonide Infuse Systemic Disease Control Lawn and Landscape Ready to Spray	Systemic	Apricots, cherries, nectarines, peaches, plums and prunes	Brown rot (blossom blight and fruit), cherry leaf spot and powdery mildew	None
streptomycin sulfate	Ferti-lome Fire Blight Spray	Contact	Apple and pear	fire blight	None
sulfur	Bonide Sulfur Plant Fungicide, Ferti-lome Dusting Sulfur, Green Light Wettable Dusting Sulfur, Hi-Yield Wettable Dusting Sulfur, Lill Miller Sulfur Dust, Safer Brand Garden Fungicide II, Southern Ag Wettable or Dusting Sulfur (peaches only)	Contact	Apples, berries, cherries, citrus, grapes, nectarines, peaches, pears, plums, prunes and strawberries	Black rot, brown rot, cedar-apple rust, frog-eye, leaf spot, powdery mildew, quince rust, rust, scab, shot hole and sooty blotch	None
sulfur + potassium salts	Safer Brand 3-in-1 Garden Spray <sup>1</sup>	Contact	Apples, grapes, pears and strawberries	Powdery mildew	None

<sup>1</sup>Available in concentrate and ready-to-use formulations.

## Landscapes

**Table 1: Fungicides available for disease management in home landscapes.**

Chemical	Product Name	Type of Fungicide	Crops	Diseases Controlled	Comments
calcium polysulfides	Hi-Yield Improved Lime Sulfur Spray	Contact	Roses and most landscape trees and shrubs	Anthrachnose, black spot, powdery mildew and rust	Highly toxic. Do not apply when temperatures exceed 85 F. Do not apply with oil or near the time of an oil application.
captan	Bonide Captan 50WP, Hi-Yield Captan 50W Fungicide, SA-50 Home and Garden Captan Fungicide	Contact	Azalea, camellias, carnation, chrysanthemum, gladiolus, tuberous begonia and rose	Black spot, Botrytis flower blight, damping-off, fungal leaf spots, petal blight, rust and tuber rot	Hi-Yield Captan 50W Fungicide can only be used on azalea, camellia, chrysanthemum and rose.
captan + insecticides	Bonide A Complete Fruit Tree Spray Concentrate, Gordon's Liquid Fruit Tree Spray, Martin's Rescue One Spray Protection	Contact	Evergreens, flowers and roses	Black spot, flower blight, leaf spots and rust	None
chlorothalonil	Bonide Fung-onil Multi-purpose Fungicide <sup>1</sup> , Ferti-lome Broad Spectrum Landscape and Garden Fungicide <sup>1</sup> , Garden Tech Daconil Fungicide <sup>1</sup> , Hi-Yield Vegetable Flower Fruit and Ornamental Fungicide, Ortho Disease B Gon Garden Fungicide Concentrate, Ortho Max Garden Disease Control Concentrate, SA-50 Liquid Ornamental and Vegetable Flowable Fungicide	Contact	Most landscape plants	Anthrachnose, Botrytis blight, downy mildew, fungal leaf spots and blights, powdery mildew and rust	None
mancozeb	Bonide Mancozeb Flowable with Zinc Concentrate, SA-50 Dithane M-45	Contact	Most landscape plants	Anthrachnose, downy mildew, fungal leaf spots and blights and rust	None
myclobutanil	Spectracide Immunox Multi-purpose Fungicide Spray Concentrate	Systemic	Most landscape plants	Anthrachnose, black spot, blossom blight, Cercospora leaf spot, petal blight, powdery mildew, rust and scab	None
myclobutanil + insecticide + fertilizer	Spectracide Immunox 3-in-1 Insect and Disease Control Plus Fertilizer, Spectracide Immunox Plus Insect and Disease Control, Spectracide Immunox Plus Insect and Disease Multi-purpose Concentrate	Systemic	A variety of landscape plants	Anthrachnose, black spot, blossom blight, Cercospora leaf spot, petal blight, powdery mildew, rust and scab	None

Chemical	Product Name	Type of Fungicide	Crops	Diseases Controlled	Comments
neem oil	Bonide Rose Rx 3-in-1 <sup>1</sup> , Bonide Tomato and Vegetable 3-in-1, Concern Garden Defense Multi-purpose Spray <sup>1</sup> , Ferti-lome Rose Flower and Vegetable Spray, Gardens Alive! Shield-All II, Green Light Neem Concentrate, Green Light Powdery Mildew Killer RTU, Green Light Rose Defense, Green Light Rose Defense Ready-To-Use, Garden Safe Fungicide 3-in-1 <sup>1</sup> , Natural Guard Neem Py, Southern Ag Triple Action Neem Oil	Contact	Most landscape plants and houseplants	Anthraco-nose, black spot, Botrytis, downy mildew, fungal leaf spots and blights, powdery mildew, rust and scab	Can be used for organic gardening. Do not use on sensitive plants (flowers of impatiens, fuchsia, hibiscus and some rose and carnation varieties).
neem oil + insecticides	Ferti-lome Triple Action Plus <sup>1</sup> , Green Light Neem II Ready-To-Use, Green Light Rose Defense II Ready-To-Use	Contact	Most landscape flowers, shrubs and houseplants	Anthraco-nose, black spot, Botrytis, downy mildew, fungal leaf spots and blights, powdery mildew, rust and scab	Do not use on sensitive plants (flowers of impatiens, fuchsia, hibiscus and some rose and carnation varieties).
phosphorus acid	Monterey Garden-Fos Systemic Fungicide	Systemic	Most landscape plants	Bacterial blight, downy mildew, <i>Phytophthora</i> and <i>Pythium</i>	None
potassium carbonate	Garden-ville Potassium Bicarbonate	Contact	Most landscape plants	Powdery mildew	None
propiconazole	Bonide Infuse Systemic Disease Control, Bonide Infuse Systemic Disease Control Lawn and Landscape Ready to Spray, Ferti-lome Liquid Systemic Fungicide II, Ferti-lome Liquid Systemic Fungicide II Ready to Spray, Gordon's Systemic Fungicide	Systemic	Most landscape plants	Anthraco-nose, black spot, fungal leaf spots, powdery mildew, rust and scab	Do not apply to African violets, begonias, Boston ferns or geraniums.
propiconazole	Bonide Infuse Systemic Disease Control, Bonide Infuse Systemic Disease Control Lawn and Landscape Ready to Spray	Systemic	Most landscape plants	Bulb, corm, rhizome, root, crown and stem rots	Do not apply to African violets, begonias, Boston ferns, or geraniums. Do not apply to home orchards.
streptomycin sulfate	Ferti-lome Fire Blight Spray	Contact	Chrysanthemum, dieffenbachia, philodendron, pyracantha and rose	Fire blight, bacterial wilt, bacterial stem rot, bacterial leaf spot and crown gall	For crown gall, apply as a soil drench.
sulfur	Bonide Sulfur Plant Fungicide, Ferti-lome Dusting Sulfur, Green Light Wettable Dusting Sulfur, Lilly Miller Sulfur Dust, Safer Brand Garden Fungicide II, Southern Ag Wettable or Dusting Sulfur	Contact	Most landscape plants	Powdery mildew, rust, downy mildew and Botrytis blight	Do not re-enter treated area for 24 hours after application. Do not use during periods of high temperatures (85 F or higher) or within 2 to 4 weeks of using an oil spray.
sulfur + insecticides	Bayer Advanced Nataria Insect Diseases and Mite Control	Contact	Most landscape plants	Black spot, Botrytis blight, downy mildew, leaf spots, powdery mildew, rust and scab	None
sulfur + potassium salts	Safer Brand 3-in-1 Garden Spray <sup>1</sup>	Contact	Most landscape plants	Black spot, leaf spots, powdery mildew and rust	Do not use in full sun, when temperature exceeds 90 F, or within 4 weeks of using an oil spray.
tebuconazole	Bayer Advanced Disease control for Roses, Flowers and Shrubs	Systemic	Most landscape plants and houseplants	Black spot, leaf spots, powdery mildew and rust	Do not apply to plants grown for food.

Chemical	Product Name	Type of Fungicide	Crops	Diseases Controlled	Comments
tebuconazole + insecticides	Bayer Advanced 3-in-1 Insect, Disease and Mite Control <sup>1</sup>	Systemic	Most landscape plants and houseplants	Anthracnose, black spot, leaf spot, petal blight, powdery mildew, rust and scab	Apply as a foliar spray every 7-14 days as necessary. Do not apply to plants grown for food.
tebuconazole + insecticides	Bayer Advanced All-in-One Rose and Flower Care, Bonide Rose Rx Systemic Drench	Systemic	Most landscape shrubs and flowers	Leaf spots (including black spot), powdery mildew, rust and southern blight	Apply as a drench every 6 weeks. Do not apply to plants grown for food.
thiophanate methyl	Bonide Infuse Systemic Disease Control Lawn and Landscape; Fertilome Halt Systemic Rose, Flower, Lawn, Ornamental Fungicide; SA-50 Thiomyl Turf and Ornamental Systemic Fungicide	Systemic	Most landscape plants	Anthracnose, flower blight, fungal bulb/corm/rhizome rots, fungal leaf spots and blights, fungal root/crown/stem rots, petal blight, powdery mildew and scab	Apply as a foliar spray, soil drench or bulb soak.
triforine	Ortho RosePride Disease Control Concentrate, Ortho RosePride Rose and Shrub Disease Control Concentrate	Systemic	A variety of landscape plants	Azalea petal blight, black spot, Entomosporium leaf spot, powdery mildew and rust	Do not use on plants grown for food.
triforine + insecticides	Ortho Orthenex Insect and Disease Control <sup>1</sup>	Systemic	A variety of landscape plants	Azalea petal blight, black spot, Entomosporium leaf spot, powdery mildew and rust	Do not use on plants grown for food.

<sup>1</sup>Available in concentrate and ready-to-use formulations.

## Lawns

**Table 1: Fungicides available for disease management of home lawns.**

Chemical	Product Name	Type of Fungicide	Diseases Controlled	Comments
captan	Hi-Yield Captan Fungicide 50WP, Southern Ag Home & Garden Captan Fungicide 50WP	Contact	Damping-off, large patch, leaf spots (melting out), root rot	None
copper	Ferti-lome Blackspot Powdery Mildew Control, SA-50 Southern Ag Liquid Copper Fungicide, Bonide Liquid Copper Soap Liquid Fungicide	Contact	Algae, ascochyta leaf blight, dollar spot, rust	Do not mix with liquid fertilizers. Don't use in spray solutions with a pH of less than 6.5. May cause staining of masonry, etc.
myclobutanil	Ferti-lome F Stop, Green Light Fung-Away Systemic Lawn Fungicide, Spectracide Immunox Lawn Disease Control (Concentrate or Granules), Spectracide Immunox Multi-purpose Fungicide Spray Concentrate	Systemic	Anthracnose, dollar spot, fusarium blight, large patch, leaf spot (melting out), spring dead spot, take-all patch, zoysia patch	None
myclobutanil + insecticide + fertilizer	Spectracide Immunox 3-in-1 Insect & Disease Control Plus Fertilizer, Spectracide Immunox Plus Insect & Disease Control, Spectracide Immunox Plus Insect & Disease Control Multipurpose Concentrate	Systemic	Dollar spot, large patch, leaf spot (melting out), spring dead spot, summer patch	None
phosphorus acid	Monterey Garden-Fos Systemic Fungicide	Systemic	Pythium blight, Pythium root rot	None
propiconazole	Bayer Avanced Fungus Control for Lawns Ready to Spray, Bayer Advanced Fungus Control for Lawns Ready to Spread Granules II, Bonide Infuse Systemic Disease Control Lawn & Landscape Ready to Spray, Ferti-lome Liquid Systemic fungicide II, Gordon's Systemic Fungicide	Systemic	Anthracnose, dollar spot, fusarium blight, gray leaf spot, large patch, leaf spot (melting out), powdery mildew, rust and take-all patch	None
thiophanate-methyl	Bonide Infuse Systemic Disease Control Lawn & Landscape Granules; Ferti-lome Halt Systemic Rose, Flower, Lawn, Ornamental Fungicide; SA-50 ThiomyI Turf and Ornamental Systemic Fungicide	Systemic	Anthracnose, dollar spot, fusarium blight, large patch, leaf spot (melting out), summer patch	None
triadimefon	Bonide Fungi-onil Lawn Disease Control, Bayer Advanced Fungus Control For Lawns, Green Light Fung-Away Systemic Lawn Fungicide Spray, High Yield Fungicide Granules	Systemic	Dollar spot, fairy rings, gray leaf spot, large patch, take-all patch	None

<sup>1</sup>Available in concentrate and ready-to-use formulations.

**Table 2: Efficacy of available fungicides for disease management of home lawns.<sup>1</sup>****Table Legend**

Efficacy <sup>1</sup>	Number
Consistently good to excellent results	4
Good to excellent control in most experiments	3
Fair to good control in most experiments	2
Inconsistent but performs well in some instances	1
Not Effective	-

Fungicides	Dollar spot	Large patch	Take-all patch, Bermuda decline, Ggg <sup>2</sup>	Gray leaf spot	Leaf spots, Melting out	Fairy rings
azoxystrobin	-	4	(3) <sup>3</sup>	4	3	3
myclobutanil	4	2	-	-	1	-
propiconazole	4	2	-2	2	2	-
triadimefon	4	4	-2	2	-	3
thiophanate-methyl	4	-	-	4	2	-

<sup>1</sup>Efficacy data are based on trials using commercial formulations of the fungicides, not the formulations readily available to homeowners. Ratings were compiled by Drs. Vincelli and Williams at the University of Kentucky (PPA-1 Chemical Control of Turfgrass Diseases 2020; <http://pest.ca.uky.edu/PSEP/Manuals/ppa1.pdf>).

<sup>2</sup>*Gaeumannomyces graminis* var. *avenae*

<sup>3</sup>Ratings within parentheses are for take-all patch caused by *Gaeumannomyces graminis* var. *avenae* (Ggg).

## Vegetables

**Table 1: Fungicides available for disease management for home vegetable gardens.**

Chemical	Product Name	Type of Fungicide	Crops	Diseases Controlled	Comments
captan	Hi-Yield Captan 50W Fungicide	Contact	Beans, beats, cabbage, corn, melons, peas, spinach, squash and swiss chard	Damping-off diseases	Seed treatment only
chlorothalonil	Bonide Fung-onil Multi-purpose Fungicide; Ferti-lome Broad Spectrum Landscape & Garden Fungicide, GardenTech Daconil® Fungicide; Hi-Yield Vegetable, Flower, Fruit and Ornamental Fungicide, Scotts Ortho® MAX® Garden Disease Control	Contact	Most vegetables	Anthracnose, Botrytis gray mold, downy mildew, early blight, fruit rots, fungal leaf spots and blights, gummy stem blight, late blight, powdery mildew, rust	None
copper	Bonide Copper Dust, Bonide Garden Dust (also contains an insecticide), Bonide Liquid Copper Fungicide, Bonide Dragoon Dust with Copper, Concern Copper Soap Fungicide, Liqui-Cop Copper Fungicide Garden Spray, Natural Guard Copper Soap Fungicide, SA-50 Southern Ag Liquid Copper Fungicide	Contact	Most vegetables	Anthracnose, bacterial leaf spots and blights, early blight, fungal leaf spots and blights, gummy stem blight, powdery mildew, scab, white rust	Can be used for organic gardening. Do not mix with liquid fertilizers. Do not use in spray solutions with a pH of less than 6.5. May cause staining of masonry, concrete, etc.
mancozeb	Bonide Mancozeb Flowable with Zinc, Southern Ag Dithane M-45	Contact	Asparagus, corn, cucurbits, onions, potaoes and tomatoes	Anthracnose, early blight, fungal leaf spots and blights, gummy stem blight, rust	None
myclobutanil	Spectracide Multi-purpos <sup>e</sup> Fungicide	Systemic	Asparagus, cucurbits, snap beans and tomatoes	Pod tip rot, powdery mildew, rust	Do not spray within 14 days of harvest.
phosphorus acid	Monterey Garden-Fos Systemic Fungicide	Systemic	Most vegetables	Root, crown and fruit rots caused by <i>Phytophthora</i> and <i>Pythium</i> species; downy mildew; late blight	None
propiconazole	Bonide Fung-onil Lawn and Garden Disease Control Ready to Spray, Bonide Infuse Systemic Disease Control Lawn and Landscape Ready to Spray, Ferti-lome Ready to Spray Liquid Systemic Fungicide, Maxide Dual Action Disease Killer Ready to Spray	Systemic	Sweet corn	Leaf spots and blights and rust	Do not spray within 14 days of harvest.

Chemical	Product Name	Type of Fungicide	Crops	Diseases Controlled	Comments
sulfur	Bonide Garden Dust, Bonide Sulfur Plant Fungicide, Bonide Tomato and Vegetable 3 in 1, Ferti-lome Dusting Sulfur, Hi-Yield Dusting Wettable Sulfur, Safer Brand Garden Fungicide II, Southern Ag Wettable or Dusting Sulfur	Contact	Beans (may injure some varieties), cole crops, onions and peas	Botrytis gray mold, downy mildew, powdery mildew, rust	Do not re-enter treated area for 24 hours after application. Do not use during periods of high temperatures (85 F or higher) or within 2-4 weeks of using an oil spray. Do not use on cucurbits (cucumbers, squash, melons, etc.).
sulfur + potassium salts	Safer Brand 3-in-1 Garden Spray <sup>1</sup>	Contact	Beans, cucumbers, peas, potatoes and squash	Powdery mildew	Do not use in full sun when temperature exceeds 90 F or within 4 weeks of an oil spray.

<sup>1</sup>Available in concentrate and ready-to-use formulations.

**Table 2: Biopesticides available for disease management for home vegetable gardens.**

Product Name	Crops	Diseases Controlled	Comments
Bayer Advanced Serenade Garden Disease Control	Most vegetables	Alternaria spots and blight, Botrytis blight, gummy stem blight, onion purple blotch, powdery mildew	None
GreenCure Foliar Fungicide	Most vegetables	Leaf spots and blights, powdery mildew	None
BioSafe Disease Control	All vegetables	Leaf spots and blights, powdery mildew	None
Novozyme Actinovate Lawn and Garden	Most vegetables and herbs	Botrytis gray mold, damping-off diseases and leaf spots and rust	None
Novozyme Actino-Iron Lawn and Garden	Most vegetables and herbs	Damping-off diseases and leaf spots and rust	None
BioWorks RootShield Home & Garden	Most vegetables	Damping-off diseases and root and crown rots	Apply to seed, plant roots and soil only.
SaferGro Mildew Cure	All vegetables	Powdery mildew	None
BioWork MilStop	Most vegetables	Powdery mildew	None
Neem Oils (many brands)	Most vegetables	Powdery mildew, rusts	None
Dr. Earth Final Stop Disease Control Fungicide	Most vegetables	Botrytis gray mold, leaf spots and blights and powdery mildew	None
Simple Success Companion Biological Fungicide	Most vegetables and herbs	Damping-off diseases and root and crown rots	None

The home gardens section was revised October 2023 by R. Singh.