



# 6 keys to achieve Growth and Yield SILIC<sup>on</sup> INCREASES



Resistance to Disease and Pest

Cell Structure

Photosynthetic Activity

Uptake of Nutrients

Resistance to Environmental Stresses

Post Harvest Life



# 6 keys to achieve Growth and Yield Silicon Increases

## Resistance to Disease and Pest

Si deposition in the epidermis tissues provides a physical barrier to pathogens and insects, allowing for a reduction in the frequency of chemical applications.

## Cell Structure

Si accumulated on the epidermal tissues increases the mechanical stability of the plant. Reduces the incident of lodging.

## Photosynthetic Activity

The improved structure produces stronger stems with more erect leaves, increasing its ability to capture light.



# 6 keys to achieve Growth and Yield Silic<sup>on</sup> Increases

## Uptake of Nutrients

Particularly Nitrogen, Phosphorous, Potassium and Micronutrients.

## Resistance to Environmental Stresses

- Reduced drought and heat stress. The deposition of Si in the plant tissues reduces transpiration rates.
- Reduce salt stress by inhibiting Sodium uptake.
- Alleviate toxicity of heavy metals: Iron, Manganese, Cadmium, Aluminium, and Zinc by regulating plant uptake

## Post Harvest Life

Si can associate with cell wall proteins where it might exert an active production of defence compounds.





# 8 Groups of Crops in which Silic<sup>on</sup> works







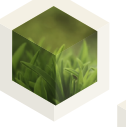





## PRODUCT RANGE



## Silic<sup>on</sup> Increases The Resistance Of Some Plant Species Against Diseases

CROP	DISEASE	REFERENCE
 — <b>Rice</b>	SHEATH BLIGHT NECK BLAST LEAF BLAST BROWN SPOT LEAF SCALD STEM ROT	Rodrigues et al (2001) Datnoff et al (1991) Seebold et al (2001) Datnoff et al (1991) Seebold et al (2000) Seebold et al (2000)
 — <b>Wheat</b>	POWDERY MILDEW	Menzies et al (2002)
 — <b>Cucumber</b>	POWDERY MILDEW	Menzies et al (1991)
 — <b>Sugarcane</b>	SUGARCANE RING SPOT	Matichenchov & Calvert (2002)
 — <b>Barley</b>	POWDERY MILDEW	Jiang et al (1989)
 — <b>Cowpea</b>	RUST	Heath & Stumpf (1986)
 — <b>Grass</b>	LEAF SPOT	Brecht et la (2004)
 — <b>Rose</b>	PODOSPHAERA PANNOSA	Shetty et la (2004)



## Effects of silicon on some soil-borne and seed-borne diseases

Hosts	Diseases	Pathogens	Effects <sup>a</sup>	References
<b>Avocado</b>	Phytophthora root rot	<i>Phytophthora cinnamomi</i>	⊕	Bekker et al. (2005)
<b>Banana</b>	Root rot	<i>Cylindrocladium spathiphylli</i>	⊕	Vermeire et al. (2011)
	Panama disease	<i>Fusarium oxysporum f. sp. cubense</i>	⊕	Fortunato et al. (2012)
	Root-knot nematode	<i>Meloidogyne javanica</i>	⊕	Oliveira et al. (2012)
<b>Bell pepper</b>	Phytophthora blight	<i>Phytophthora capsici</i>	⊕	Lee et al. (2004), French-Monar et al. (2010)
<b>Bitter melon</b>	Pythium root rot	<i>Pythium aphanidermatum</i>	⊕	Heine et al. (2007)
<b>Coffee</b>	Root-knot nematode	<i>Meloidogyne exigua</i>	⊕	Silva et al. (2010)
<b>Corn</b>	Pythium root rot	<i>Pythium aphanidermatum</i>	⊕	Sun et al. (1994)
	Stalk rot	<i>Fusarium moniliforme</i>	⊕	
<b>Creeping betgrass</b>	Pythium root rot	<i>Pythium aphanidermatum</i>	⊕	North Carolina State University (1997), Schmidt et al. (1999), Rondeau (2001), Uriarte et al. (2004), Zhang et al. (2006)
	Dollar spot	<i>Sclerotinia homoeocarpa</i>	⊕	
	Brown patch	<i>Rhizoctonia solani</i>	⊕	
<b>Cucumber</b>	Crown and root rot	<i>Pythium ultimum</i>	⊕	Chérif and Bélanger (1992)
	Crown and root rot	<i>Pythium aphanidermatum</i>	⊕	Chérif et al. (1994)
	Fusarium wilt	<i>Fusarium oxysporum f. sp. cucumerinum</i>	⊕	Miyaki and Takahashi (1983)
<b>Lettuce</b>	Fusarium wilt	<i>Fusarium oxysporum f. sp. lactucae</i>	⊕	Chitarra et al. (2013)

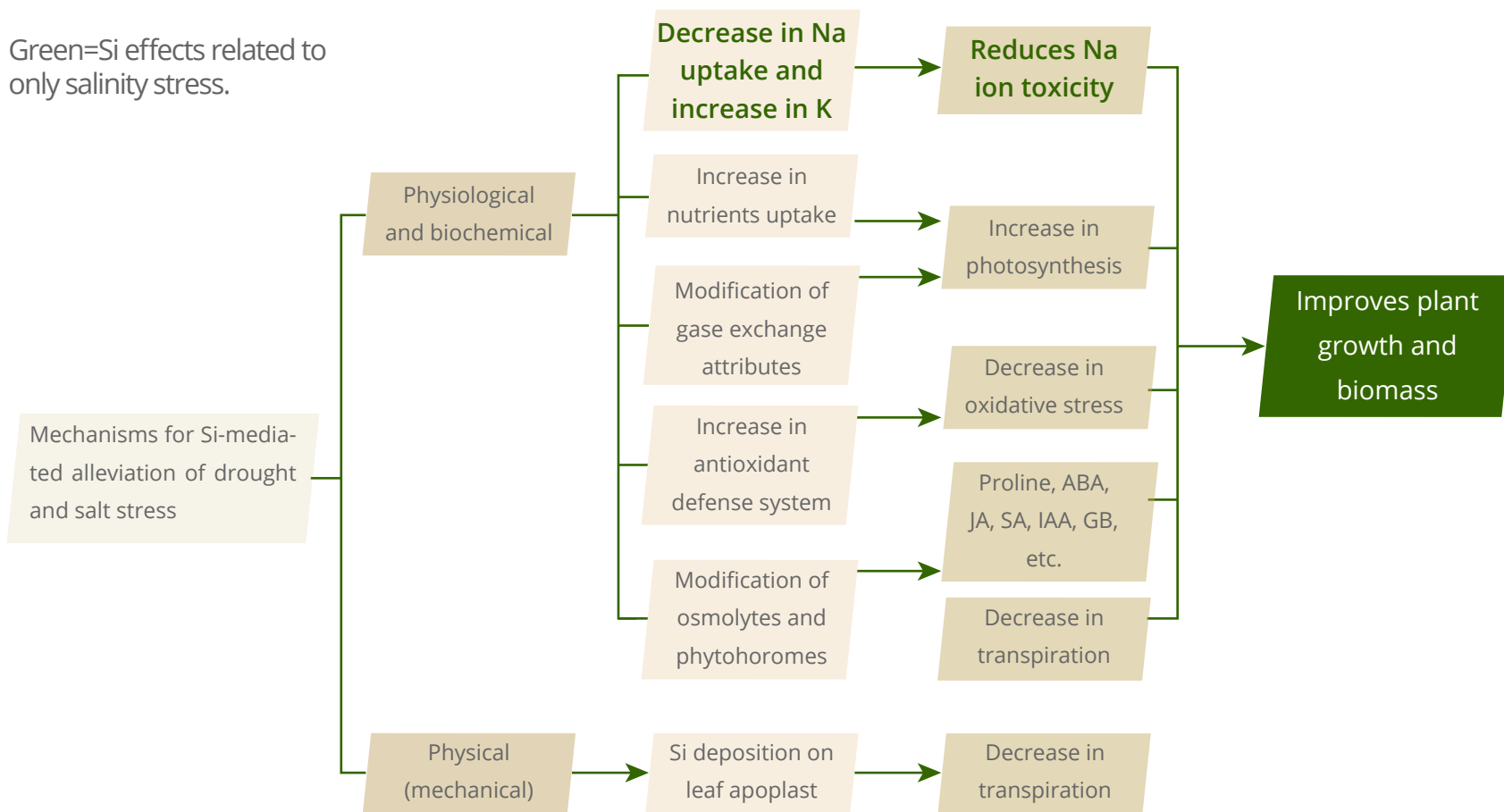
Hosts	Diseases	Pathogens	Effects <sup>a</sup>	References
<b>Melon</b>	Fusarium root rot	<i>Fusarium spp.</i>	⊕	Liu et al. (2009)
<b>Oil palm</b>	Basal stem rot	<i>Ganoderma boninense</i>	⊕	Najihah et al. (2015)
<b>Perennial ryegrass</b>	Fusarium patch	<i>Microdochim nivale</i>	⊕	MacDonagh and Hunter (2010)
<b>Rice</b>	Root knot nematodes	<i>Meloidogyne spp.</i>	⊕	Swain and Prasad (1988)
	Grain discoloration	<i>Many fungal species</i>	⊕	Winslow (1992), Korndörfer et al. (1999), Prabhu et al. (2012), Dallagnol et al. (2013, 2014)
<b>Soybean</b>	Phytophthora root rot	<i>Phytophthora sojae</i>	⊕	Guérin et al. (2014)
<b>Tomato</b>	Fusarium crown and root rot	<i>Fusarium oxysporum f. sp. radices-lycopersici</i>	⊕	Guérin et al. (2014)
	Pythium root rot	<i>Pythium aphanidermatum</i>	⊕	Heine et al. (2007)
	Bacterial wilt	<i>Ralstonia solanacearum</i>	⊕	Dannon and Wydra (2004), Kiirika et al. (2013)
<b>Watermelon</b>	Gummy stem blight	<i>Didymella bryoniae</i>	⊕	Santos et al. (2010)
<b>Wheat</b>	Foot rot	<i>Fusarium spp.</i>	⊕	Rodgers-Gray and Shaw (2000; 2004)
<b>Zoysiagrass</b>	Brown patch	<i>Rhizoctonia solani</i>	⊕	Saigusa et al. (2000)

<sup>a</sup> Silic<sup>on</sup> decrease (⊕ ) on disease intensity



## Mechanisms for Si-mediated alleviation of drought and salt stress in plants

Green=Si effects related to only salinity stress.



Rizwan M. et al (2015)

# 6 Range of Silic Products



Silicon ( $\text{SiO}_2$ ) 30,0% w/w  
Potassium ( $\text{K}_2\text{O}$ ) 10,0% w/w



Silicon ( $\text{SiO}_2$ ) 12,0% w/w  
Seaweed Extract  
Ecklonia Maxima 22,7% w/w



Silicon ( $\text{SiO}_2$ ) 24,0% w/w  
Calcium ( $\text{Ca}$ ) 15,0% w/w



Silicon ( $\text{SiO}_2$ ) 28,0% w/w  
Magnesium ( $\text{MgO}$ ) 14,0% w/w



Silicon ( $\text{SiO}_2$ ) 18,0% w/w  
Calcium ( $\text{CaO}$ ) 13,5% w/w  
Magnesium ( $\text{MgO}$ ) 5,5% w/w



Silicon ( $\text{SiO}_2$ ) 22% w/w  
Free Amino acids 2,5% w/w

