



# Tomato Fruit Quality: What's important for color?



## The Problem

Internal white tissue, yellow eye, yellow shoulder, and green shoulder are symptoms of the same problem, Yellow Shoulder Disorder (YSD). YSD reduces the nutritional value of tomato fruit and reduces profit for both growers and processors. The discoloration has a physiological cause beginning early in fruit development and cannot be reversed by delaying harvest.

## Improving color of tomato fruit: what we know so far

Many factors are involved in the occurrence of YSD including:

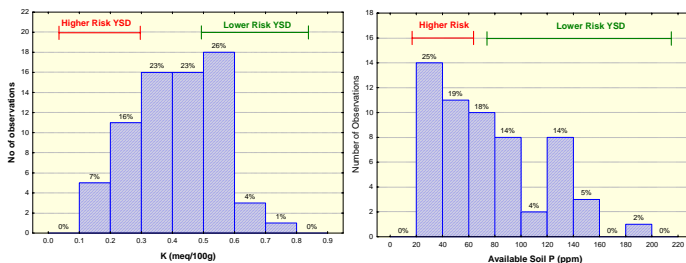
- 1.Genetics:** Choice of variety explains 10 - 20 % of the of YSD occurrence.
- 2.Location:** Type of soil, fertility status and overall quality of the soil explains 20 - 30 % of YSD occurrence.
- 3.Weather:** Air temperature, solar radiation, soil moisture, and precipitation can affect YSD, explaining 5-10% of occurrence.
- 4.Interactions between factors:** Combinations of the above factors account for 40 - 65 % of YSD occurrence.

## What we can manage:

**Variety:** **OX23** and **Heinz 9423** have **good** color uniformity and low risk for yellow shoulder. **PS696**, **Ohio8245** and **Heinz 9035** have **poor** color uniformity and high risk of yellow shoulder.

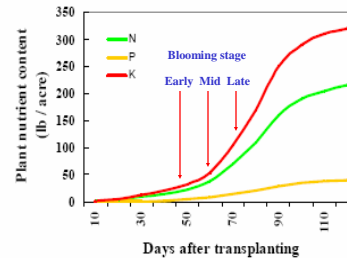
**Soil Quality:** Adequate Organic Matter and pH are associated with reduced risk of YSD. Soil nutrients (K, Ca, Mg and P) are also associated with reduced risk, with color improvement noted when soil K, P and Ca are in adequate levels. Management should also focus on reducing soil compaction to improve soil structure. For more information see:

[www.oardc.ohio-state.edu/tomato/managingcolor.htm](http://www.oardc.ohio-state.edu/tomato/managingcolor.htm)



## How to manage soil nutrients to reduce risk of YSD

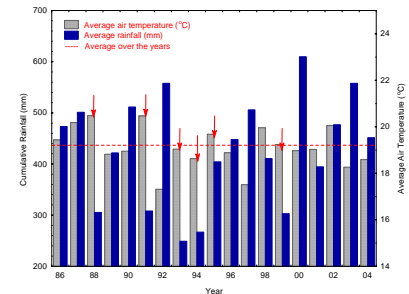
Target K application to the flowering stage for the most benefit.



Variety	Treatment	% Top Rated fruit	Yield T/A
GEM 611	No K	68.8	30.5
	Mid-Bloom	75.0	32.3
H 9243	No K	62.5	29.2
	Mid-Bloom	67.2	36.9
PS 696	No K	29.7	34.0
	Mid-Bloom	31.3	45.6
OX 23	No K	67.2	32.8
	Mid-Bloom	68.8	36.9

Application of Potassium Chloride through drip irrigation improves tomato color and yield. Positive results were observed in 2003 and 2004; both years had precipitation above average.

Weather records for NW Ohio and Indiana show that irrigation is important to crop management 1 in 3 years. Even in wet cool years, a positive effect can be attributed to irrigation and timely K application.



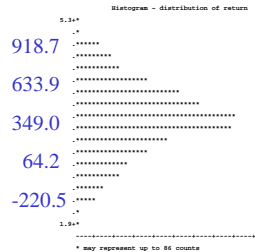
## K application during flowering may improve color and yield, but response to fertilization is dependent on:

- Current level of exchangeable K in the soil
- Soil cation ratio (Ca, Mg, K, Na)
- Soil fixation of K
- Tomato variety
- Current soil quality status

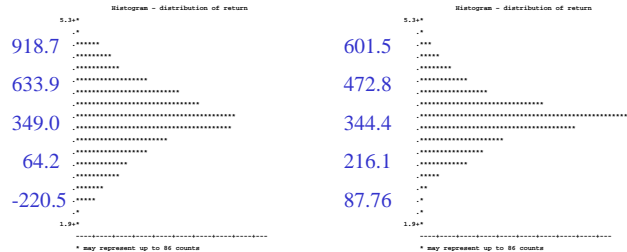
## Economic simulations suggest that managing for color through variety choice or K application may lower the financial risk associated with tomato production

### Distribution of Return above Cost

Non-Uniform Variety (susceptible to YSD)



Uniform Color Variety



## Soil Nutrient Balance: Points to consider

- Excess application of K fertilizer can cause nutrient imbalance.
- Heavy application of gypsum can reduce exchangeable K and Mg.
- Not all K applied is directly available to plants.
- Some loss of K may occur by soil fixation and leaching.

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