

## Maximizing Vase Life of Zinnias

Want to know (as I did) how to maximize the bloom quality of zinnia arrangements by extending the life of the blooms?

I grow zinnias elegans for the cut flower market in our town. I want to maximize the bloom quality in vases so they have a longer shelf life in stores and, most importantly, provide pleasure as long as possible for the customer.

So, I turned to the internet and Google searches and uncovered many commercial and DIY recommendations. I also found many theories as to what is needed to extend vase life of cut flowers.

My first treatment using a website formula killed all my flowers within 24 hours. I Found so many conflicting opinions and studies that I decided to run my own experiments to determine the factors that would influence and maximize vase life of cut zinnias.

The general thinking is that cut flowers need :

- Low pH (acid) to improve take-up of water and additives.
- Sugar as a nutrient to keep feeding the blooms.
- A biocide like Clorox to retard bacterial growth.
- Optimum storage and cutting conditions.

So, I started my experiments using these variables. I am providing a summary statement of what I learned over all as well as in each experiment. The details of the experiments and results are attached.

Overall Summary –

- **The bottom line is that the condition for maximum vase life is to just use tap water with no additives.** Sounds too good to be true!
- Change the water every 3 days.
- Plain tap water is defined as
  - pH of 7
  - PPM of dissolved solids 50-100
  - Electrical Conductivity of 100-150
- **The stage of bloom development is important and nothing can extend life of flowers picked too late in the bloom cycle.**
- **Plant and harvest varieties that naturally have longer vase life.**
- Not a controlled experiment but there is evidence that blooms harvested in September time frame have reduced vase life compared with flowers harvested in June time frame.

Plans for 2022 Season

- Evaluate properly the vase life of June flowers vs. September flowers.
- Run Vase Life vs. Variety of Benary Giant flowers to include all available varieties.

#### Experiment 1- Attachment A

- This experiment evaluated plain tap water vs. presence of a variety of suggested additives at different concentrations.
- Plain tap water is defined as
  - pH of 7
  - PPM of dissolved solids 50-100
  - Electrical Conductivity of 100-150
- Some additives outright killed flowers quickly or significantly reduced vase life.
- No additives were tested that extended vase life.
- Conclusion is to use tap water.

#### Experiment 2- Attachment B

- This experiment evaluated the stage of bloom at the time of picking.
- There is an optimum time to pick a bloom
  - Ray petals are fully opened.
  - Disk florets are opening.
  - The ovary is not swollen as the flower has not been pollinated.

#### Experiment 3- Attachment C

- This experiment evaluated two factors
  - Vase environment
    - No significant difference if placed inside or outside.
  - Use of citric acid as the pH adjustment method
    - Additive offers no help in extending vase life.

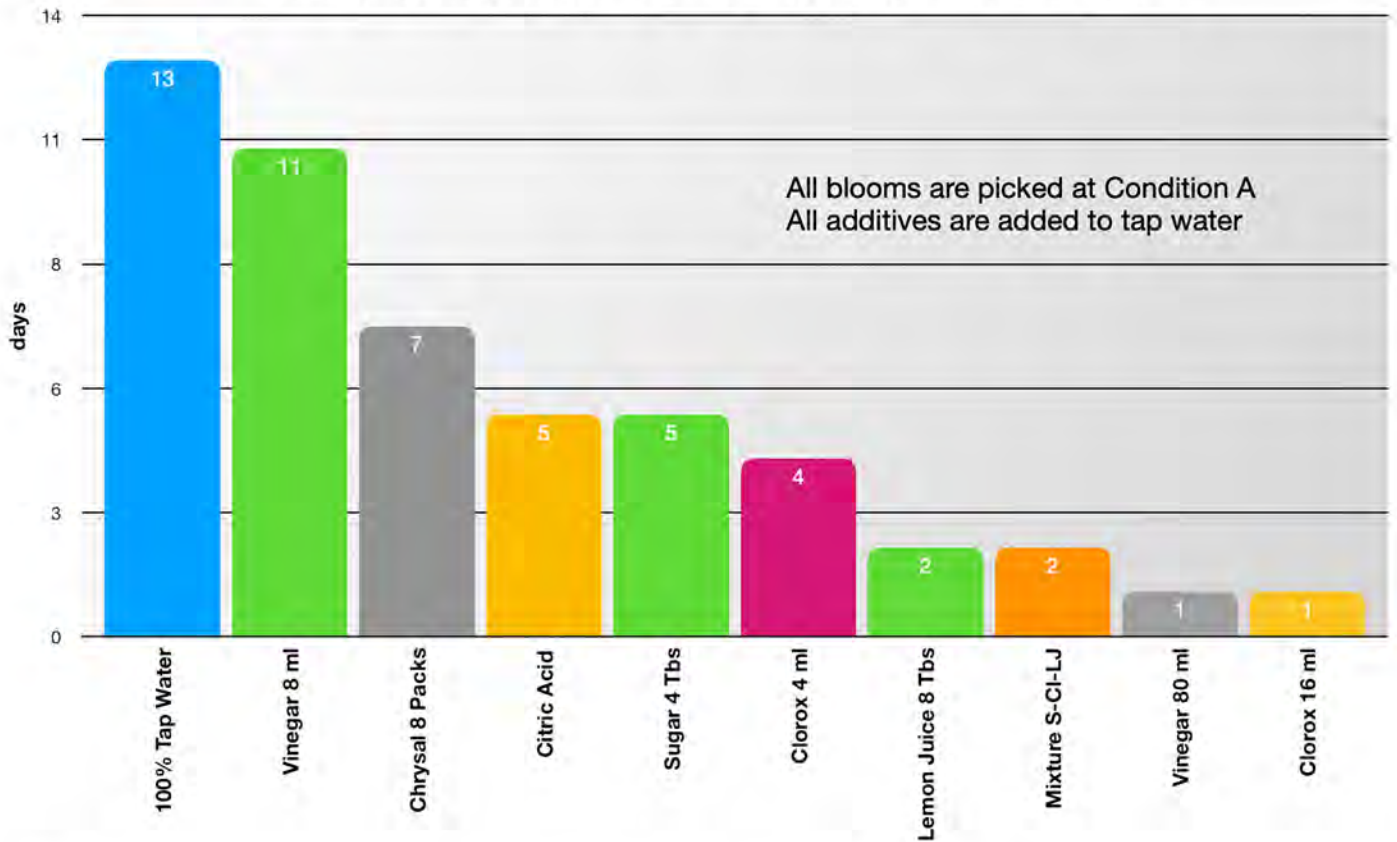
#### Experiment 4- Attachment D

- This experiment evaluated several varieties of Benary Giant zinnias by color.
- Color variety makes a difference.
  - Darker colors *appear* fresher longer than lighter colors
  - The deterioration of bloom quality (fading of ray petals on outer edges) is basically the same for all of the blooms but not as noticeable in the darker colors.

#### Future Experiments and evaluations.

- Evaluations of All Benary Giant varieties
- Evaluation of June harvest vs September harvest

**Vase Days of Acceptable Bloom Quality vs. Type of Water Treatment per Gallon**



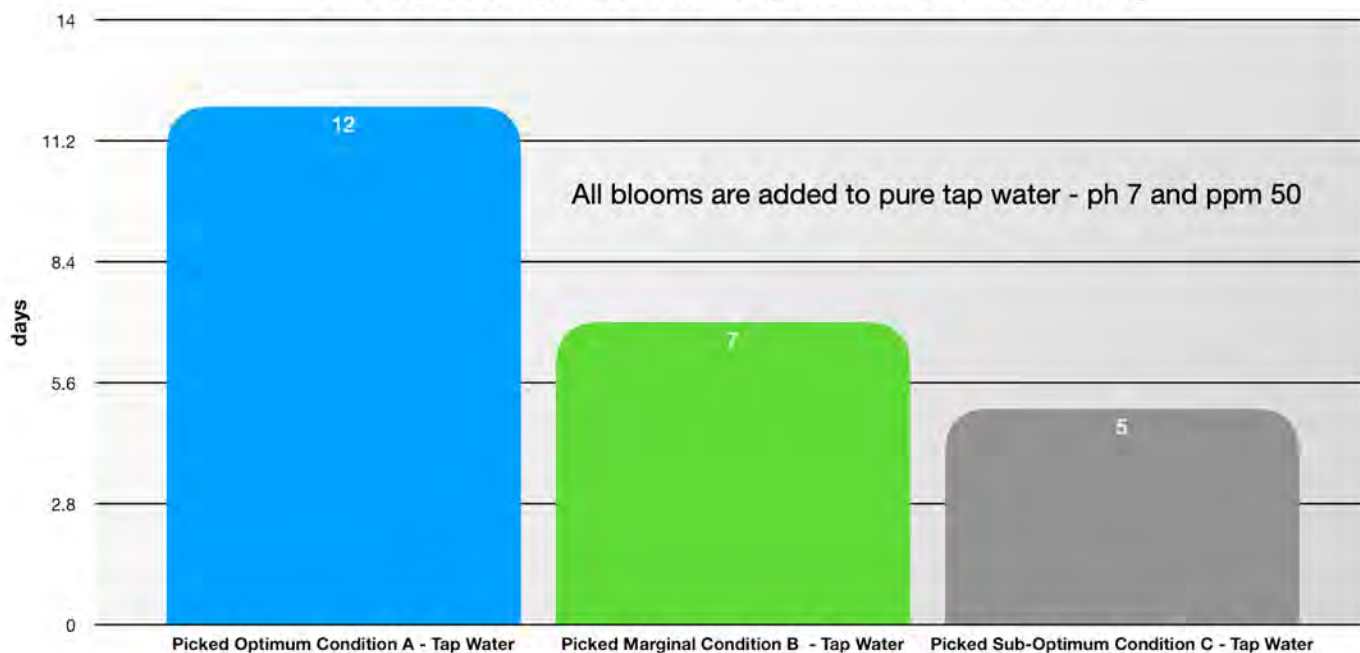
Vase Water	Days Acceptable Bloom Quality	Description
100% Tap Water	13	Tap Water pH-7 ppm-50
Vinegar 8 ml	11	White Vinegar (at 10% recommended amount) 8 ml per gallon tap water
Chrysal 8 Packs	7	8 packs per gallon of water
Citric Acid	5	1.4 tsp per gallon of tap water
Sugar 4 Tbs	5	White sugar 4 tablespoons per gallon tap water
Clorox 4 ml	4	Clorox bleach (at 25% recommended amount) 4 ml per gallon tap water
Lemon Juice 8 Tbs	2	Lemon juice concentrate 8 tablespoons per gallon tap water
Mixture S-CI-LJ	2	Combination of Sugar, Clorox, and Lemon Juice
Vinegar 80 ml	1	White Vinegar at recommended 80 ml per gallon tap water
Clorox 16 ml	1	Clorox bleach at recommended 16 ml per gallon of tap water

Bloom Condition A - Ray flowers (“petals”) are fully opened.

Bloom Condition B - Condition A plus the disk florets (those little yellow ring of “flowers”) around the center disk are fully opened.

Bloom Condition C - Condition A&B plus pollination has occurred as the ovary has swollen with pollinated seeds.

**Vase Days of Acceptable Bloom Quality vs. Bloom Condition at Picking**



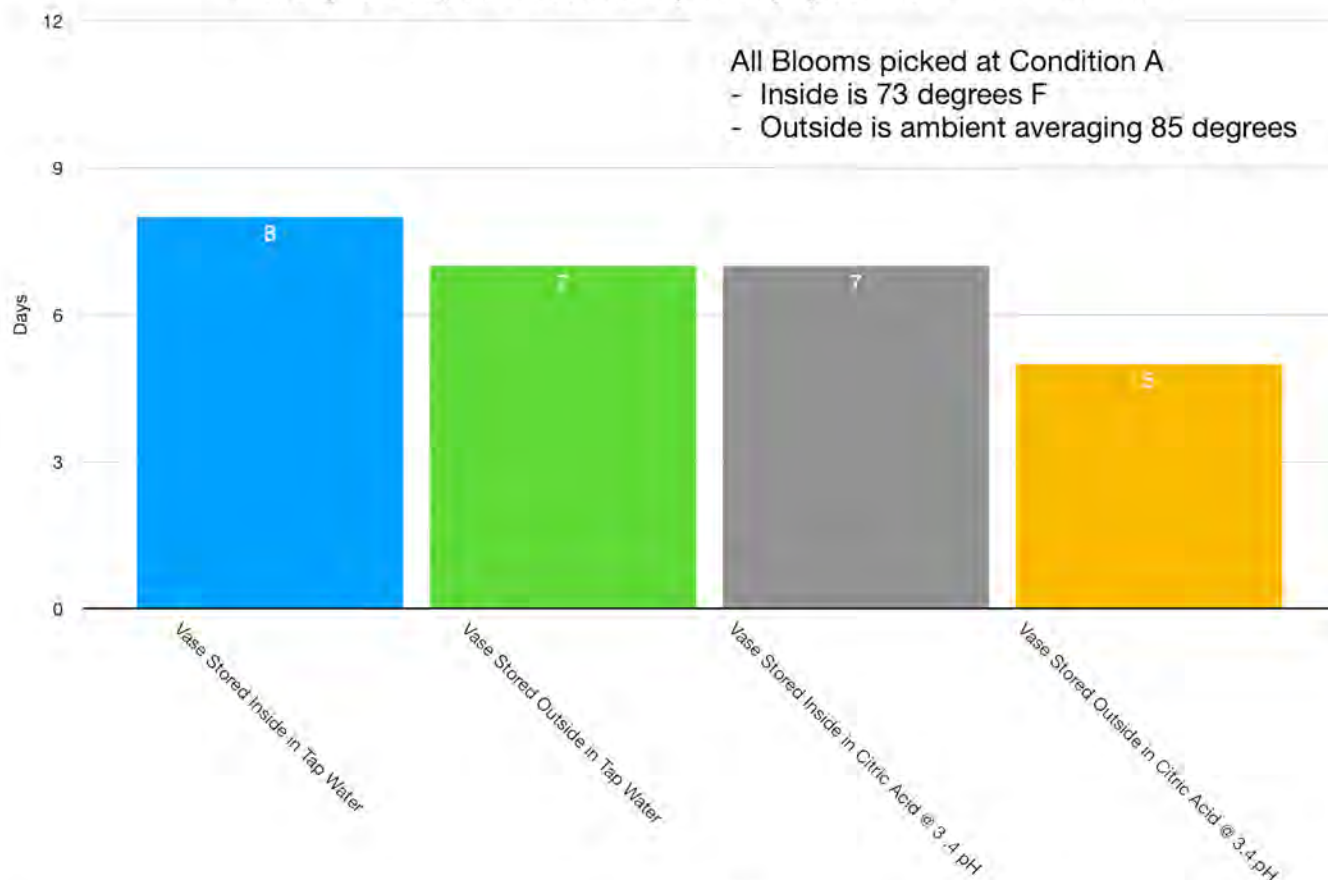
Vase Water	Days Acceptable Bloom Quality	Description
Picked Optimum Condition A - Tap Water	12	Bloom Condition A
Picked Marginal Condition B - Tap Water	7	Bloom Condition B
Picked Sub-Optimum Condition C - Tap Water	5	Bloom Condition C

Bloom Condition A - Ray flowers (“petals”) are fully opened.

Bloom Condition B - Condition A plus the disk florets (those little yellow ring of “flowers”) around the center disk are fully opened.

Bloom Condition C - Condition A&B plus pollination has occurred as the ovary has swollen with pollinated seeds.

### Vase Days of Acceptable Bloom Quality vs. Display Conditions vs. Water Treatment



**Table 2-1**

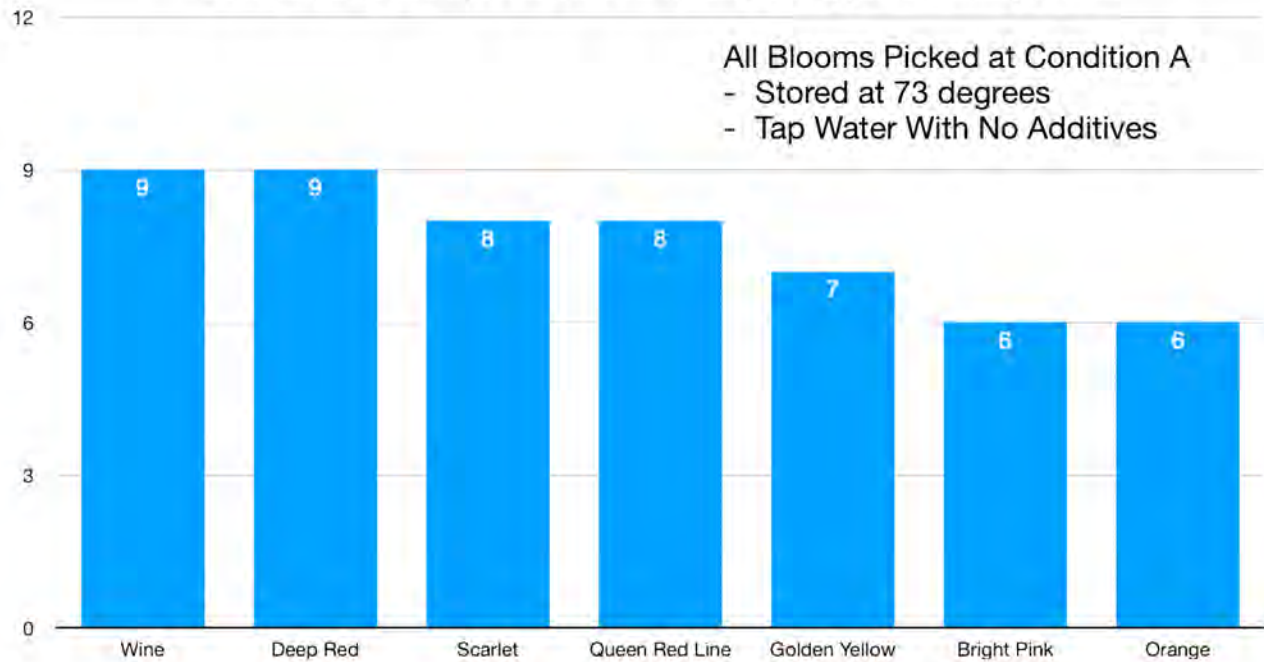
Condition	Days Acceptable Bloom Quality	Condition
Vase Stored Inside in Tap Water	8	Pick Condition A - Temp 72 F : Water pH - 7.0 ppm 54 EC - 114
Vase Stored Outside in Tap Water	7	Pick Condition A - Temp 80 - 95 F : Water pH - 7.0 ppm 54 EC - 114
Vase Stored Inside in Citric Acid @ 3.4 pH	7	Pick Condition A - Temp 72 F - 1/4 tsp per gallon of citric acid
Vase Stored Outside in Citric Acid @ 3.4 pH	5	Pick Condition A - Temp 80 - 95 F - 1/4 tsp per gallon of citric acid

Bloom Condition A - Ray flowers (“petals”) are fully opened.

Bloom Condition B - Condition A plus the disk florets (those little yellow ring of “flowers”) around the center disk are fully opened.

Bloom Condition C - Condition A&B plus pollination has occurred as the ovary has swollen with pollinated seeds.

### Vase Days of Acceptable Bloom Quality vs. Type of Benary Zinnia



Type of Zinnia	Days of Acceptable Bloom Quality
Wine	9
Deep Red	9
Scarlet	8
Queen Red Line	8
Golden Yellow	7
Bright Pink	6
Orange	6

Bloom Condition A - Ray flowers ("petals") are fully opened.

Bloom Condition B - Condition A plus the disk florets (those little yellow ring of "flowers") around the center disk are fully opened.

Bloom Condition C - Condition A & B plus pollination has occurred as the ovary has swollen with pollinated seeds.