Apple – *Malus domestica*

Key Cultivars:

Early season (*August*)

- Zestar!
- Paula Red

Mid-season (*September*)

- Honeycrisp
- Gala

Late season (*October*)

- Fuji
- Pink Lady

Climate Risk Notes:

Absolute minimum temperature during dormancy is very dependent on the crop's acclimation to changing temperatures. If drops in temperature are gradual through fall /winter, apples can adapt to winters with more extreme low temperatures. However, damage to dormant buds will occur with sudden drops in temp.

Bud break and **spring frost** are factors that scientists are not currently able to predict. As climate changes, bud break will shift earlier, increasing the risk of bud damage due to spring frosts.

Sudden changes in temperature causes physiological stress on plants, making them more susceptible to pest & disease outbreaks in single species cropping systems. Integrated pest & disease management in a changing climate is recommended.

Different cultivars are grafted to rootstock with different moisture requirements, and tolerance to soil types. Our model tries to capture as wide a range of many cultivars in each dataset, but more research by land managers into requirements for specific cultivars is necessary for best cultivar selection and planting placement.

Precipitation requirements is very dependent on rootstock selection, soil type, and soil drainage. Additional information on the specifics of each soil type will need to be ascertained before determining more specific water requirements.

	Key Months for Crop ***(Fruit)*** *Development and Thresholds*											
	DEC	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**
Stage of growth *(under current conditions)*	Dormant [d, i, p]	Dormant [d, i, p]	Dormant [d, i, p]	Planting, Bud swell [a, d, i, p]	Planting, Bud break [a, d, i, p]	Flowering [d, i, p]	Flowering [d, i, p]	Fruit Set [d, i, p]	Harvest [d, i, p]	Harvest [d, i, p]	Harvest [d, i, p]	Dormant [d, i, p]
Min Temp *(°F)*	-31 [a, c, k, n]	-40 [c, k, n]	-31 [a, c, k, n]	5-15 [a, j, p]	23 [a, j, p]	23-27 [a]	23-27 [a]	23-27 [a]	23-27 [a]	23-27 [a]	23-27 [a]	-22 [a, c, k, n]
Max Temp *(°F)*				86 [a, o]	95 [a, o]	104 [a, o]	108 [o]	108 [o]	108 [o]	104 [a, o]	104 [a, o]	

Climate									*Soil*						
Min Optimal Temp (°F)	**Max Optimal Temp (°F)**	**Min Absolute Temp (°F)**	**Max Absolute Temp (°F)**	**Germination Soil Temp (°F)**	**Growing Degree Days (50°F base)**	**Chilling Hours (32-45 °F)**	**Min Rainfall (in/year)**	**Max Rainfall (in/year)**	**Min pH**	**Max pH**	**Optimal Soil Texture**	**Absolute Soil Texture**	**Optimal Soil Drainage**	**Absolute Soil Drainage**	**Soil Depth (in)**
14-45 [a, c, k, n]	77-82 [a, l]	-40 [c, k, n]	108 [o]	*NA*	*NA*	200 to 1800 [a, b, c, j]	12 [f]	62 [f]	5.5. [a, h, n, o]	8 [a, h, n, o]	Sandy loam, sandy clay loam [f, h, o]	Sandy clay, silty clay, clay loam, silty clay loam, loam, silt loam, loamy sand [f, h, o]	Well drained, moderately well drained [e, g, h]	Excessively drained, somewhat excessively drained, somewhat poorly drained [e, g, h]	24 [a, e, h, n]

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