

Alaska Agriculture in the Classroom – Standards Matchup with the State of Alaska and NGSS

Lesson	Key Topics	State of AK	NGSS
Standards Key			
PS = Physical Science, LS = Life Science, ESS = Earth and Space Science, ETS = Engineering, Technology, and Applications of Science			

Lesson (Grade Level Suggested)	Key Topics	State of Alaska Standards	NGSS Standards
Growing in Soil			
1. Reading a Seed Packet (K-12)	<ul style="list-style-type: none"> • Reading and Comprehending Scientific Technical Information • Venn Diagrams • Plant Life Cycles • Plant Light and Soil Nutrient Needs • Horticulture • Germination • Propagation • Recording Scientific Data • Drawing Conclusions from Experimentation 	K-LS1-1 1-LS1-1 2-LS2-1 3-LS4-4 4-LS1-1 5-LS1-1 MS-LS1-5 HS-LS1-2	K-LS1-1 K-ESS2-2 K-ESS3-1 1-LS1-1 2-LS2-1 3-LS3-1 4-LS1-1 5-LS1-1 MS-LS2-1 HS-LS2-2
2. Starting Plants in the Classroom (K-12)	<ul style="list-style-type: none"> • Reading and Comprehending Scientific Technical Information • Horticulture • Transplanting • Hydroponics • Plant Life Cycles • Array Mathematics and Grids • Germination • Plant light and soil nutrient needs • Standardized Science Measurements • Science Journaling • Recording Scientific Data in Tables • Drawing Conclusions from Experimentation 	K-LS1-1 K-2-ETS1-2 1-LS1-1 2-LS2-1 3-LS4-4 4-LS1-1 5-LS1-1 5-LS2-1 MS-LS1-5 MS-ETS1-1 HS-LS1-2	K-LS1-1 K-ESS2-2 K-ESS3-1 1-LS1-1 2-LS2-1 3-LS1-1 3-LS3-2 4-LS1-1 5-PS3-1 5-LS1-1 MS-LS1-5 MS-ETS1-1 HS-LS2-2 HS-ESS2-6
3. Salad Container Greenhouse (2-8)	<ul style="list-style-type: none"> • Plant light and soil nutrient needs • Standardized Science • Standardized Science Measurements • Horticulture • Germination 	2-LS2-1 3-LS4-4 4-LS1-1 5-PS3-1 5-LS1-1	2-LS2-1 2-PS1-4 K-2-ETS1-1 3-LS1-1 3-LS3-2

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Lesson	Key Topics	State of AK	NGSS
	<ul style="list-style-type: none"> • Engineering – Greenhouse Construction and Function • Recycling • Plant Life Cycles • Careers in Agricultural Science • Standardized Science Measurements • Recording Scientific Data in Tables • Light Wave Physics – Types of Light • Recording Scientific Data in Tables • Drawing Conclusions from Experimentation 	5-LS2-1 MS-LS1-5 MS-ESS3-5 MS-ETS1-2	4-LS1-1 5-PS3-1 5-LS1-1 3-5-ETS1-1 MS-LS1-5 MS-LS1-6 MS-LS2-1 MS-LS3-3 MS-ETS1-1
Soil & Nutrition			
4. Garden Soil Exploration (K-12)	<ul style="list-style-type: none"> • Introduction to Soil Composition and Types • Plant soil nutrient needs • Hydrology – water cycles • Geological Creation of Soil • Agriculture • Composting • Field Testing of Soil – Ribbon Test • Engineering – Constructing Soil Drainage Systems • Standardized Science Measurements • Recording Scientific Data in Tables • Small Scale construction of a Compost System • Drawing Conclusions from Experimentation 	K-LS1-1 K-2-ETS1-2 1-LS1-1 2-LS2-1 2-PS1-4 3-LS4-4 4-ESS2-1 5-PS3-1 5-LS1-1 5-LS2-1 MS-LS1-5 MS-LS2-1 MS-LS2-3 HS-LS1-5 HS-LS2-3 HS-ESS2-2 HS-ESS2-7	K-LS1-1 K-ESS2-2 K-ESS3-1 1-LS1-1 2-LS2-1 2-PS1-2 K-2-ETS1-3 3-LS3-2 4-ESS2-1 5-PS3-1 5-LS1-1 3-5-ETS1-1 MS-LS1-5 MS-LS2-1 MS-LS3-3 MS-ETS1-1 HS-LS2-6 HS-ESS2-6 HS-ESS2-7 HS-ESS3-4 HS-ETS1-1
5. The Right Diet for Your Plants (6-8)	<ul style="list-style-type: none"> • Soil Composition and Types • Plant soil nutrient needs • Fertilizers • Human nutrient needs • Plant nutrient needs 	MS-LS1-5 MS-LS2-1 MS-LS1-7	MS-LS1-5 MS-LS2-1

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Lesson	Key Topics	State of AK	NGSS
	<ul style="list-style-type: none"> • Plant Life Cycles • Soil Improvement • Reading labels for fertilizers • Reading advertisements • Agricultural Economics – Products Promotion, Designing Advertisements for Soil Supplements • Recording Scientific Data • Standardized Science Measurements • Drawing Conclusions from Experimentation 		
6. Plant Nutrient Deficiencies (6-8)	<ul style="list-style-type: none"> • Plant Nutrient Needs • Nutrient Balance in Agricultural Soils • Fertilizers • Nutrient Deficiencies in Plants • Nutrient Deficiencies in Humans • Plant Nutrient Toxicities • Macronutrients and Micronutrients • Nitrogen Fixation • Organic vs. Commercial Fertilizers • Humanity Against Hunger – Social Concerns • Recording Scientific Data • Standardized Science Measurements • Drawing Conclusions from Experimentation 	MS-LS1-5 MS-LS2-4 MS-ESS3-2	MS-LS1-5 MS-LS2-4 MS-LS4-5 MS-ETS1-1
Plant Growth			
7. Do You Know the Parts of Plants? (K-6)	<ul style="list-style-type: none"> • Introduction to Plant Anatomy • Plant Life Cycles • Plant Dynamics (circulation and nutrient uptake) • Photosynthesis • Singing to Remember • Recording Scientific Data • Standardized Science Measurements • Drawing Conclusions from Experimentation (hands-on, observation, drawing, and note-taking) 	K-LS1-1 1-LS1-1 2-LS4-1 3-LS4-4	K-LS1-1 K-ESS2-2 K-ESS3-1 1-LS1-1 2-LS2-1 3-LS1-1
8. Plant Parts: Roots (2-6)	<ul style="list-style-type: none"> • Plant Anatomy • Plant Life Cycles • Plant Dynamics (circulation and nutrient uptake) 	2-LS4-1 3-LS4-4 4-LS1-1	2-LS2-1 2-PS1-1 3-LS1-1

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Lesson	Key Topics	State of AK	NGSS
	<ul style="list-style-type: none"> • Recording Scientific Data • Standardized Science Measurements • Drawing Conclusions from Experimentation (hands-on, observation, drawing, and note-taking) 	5-LS1-1 5-LS2-1 MS-LS1-1 MS-LS1-2 MS-LS1-4	4-LS1-1 5-LS1-1 MS-LS1-1 MS-LS1-2
9. Plant Parts: Stems (2-6)	<ul style="list-style-type: none"> • Plant Anatomy • Plant Life Cycles • Plant Dynamics (circulation and nutrient uptake) • Evapotranspiration and Transpiration • Recording Scientific Data in Tables • Standardized Science Measurements • Drawing Conclusions from Experimentation (hands-on, observation, drawing, and note-taking) 	2-LS4-1 3-LS4-4 4-LS1-1 5-LS1-1 5-LS2-1 MS-LS1-1 MS-LS1-2 MS-LS1-4	2-LS2-1 2-PS1-1 3-LS1-1 4-LS1-1 5-LS1-1 MS-LS1-1 MS-LS1-2
10. Plant Parts: Seeds (3-6)	<ul style="list-style-type: none"> • Plant Anatomy • Plant Life Cycles • Plant Dynamics (circulation and nutrient uptake) • Germination • Recording Scientific Data • Standardized Science Measurements • Drawing Conclusions from Experimentation (hands-on, observation, drawing, and note-taking) 	3-LS4-4 4-LS1-1 5-LS1-1 5-LS2-1 MS-LS1-1 MS-LS1-2 MS-LS1-4	3-LS1-1 4-LS1-1 5-LS1-1 MS-LS1-1 MS-LS1-2
11. Plant Parts: Leaves (3-6)	<ul style="list-style-type: none"> • Plant Anatomy • Plant Life Cycles • Plant Dynamics (circulation and nutrient uptake) • Photosynthesis • Recording Scientific Data • Standardized Science Measurements • Drawing Conclusions from Experimentation (hands-on, observation, drawing, and note-taking) 	3-LS4-4 4-LS1-1 5-LS1-1 5-LS2-1 MS-LS1-1 MS-LS1-2 MS-LS1-4 MS-LS1-6	3-LS1-1 4-LS1-1 5-LS1-1 MS-LS1-1 MS-LS1-2 MS-LS1-6
12. Hydroponic Plant Growth Lesson (3-12)	<ul style="list-style-type: none"> • Plant Anatomy • Plant Life Cycles • Plant Dynamics (circulation and nutrient uptake) • Hydroponics • pH Testing • Photosynthesis 	3-LS4-4 4-LS1-1 5-PS3-1 5-LS1-1 5-LS2-1 MS-LS1-5	3-LS1-1 3-LS4-3 4-LS1-1 5-PS3-1 5-LS1-1 3-5-ETS1-1

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Lesson	Key Topics	State of AK	NGSS
	<ul style="list-style-type: none"> • Pollination • Nutrient Uptake • Lighting Systems • Recording Scientific Data in Tables • Standardized Science Measurements • Drawing Conclusions from Experimentation (hands-on, observation, drawing, and note-taking) 	MS-LS1-6 MS-ETS1-1 HS-LS1-2 HS-LS1-5 HS-LS2-3 HS-LS2-5 HS-ESS3-4	MS-LS1-5 MS-LS1-6 MS-LS2-1 MS-LS3-3 MS-ESS3-3 HS-LS1-5 HS-LS2-7 HS-ESS2-6 HS-ESS2-7 HS-ESS3-4 HS-ETS1-1
13. Harvesting Plants: Leaves (2-8)	<ul style="list-style-type: none"> • Plant Anatomy • Plant Life Cycles • Plant Dynamics (circulation and nutrient uptake) • Agriculture – Harvesting • Photosynthesis – Chemistry • Recording Scientific Data • Standardized Science Measurements • Drawing Conclusions from Experimentation (hands-on, observation, drawing, and note-taking) 	2-LS4-1 3-LS4-4 4-LS1-1 5-LS1-1 5-LS2-1 MS-LS1-1 MS-LS1-2	2-LS2-1 2-PS1-1 3-LS1-1 4-LS3-1 5-LS1-1 MS-LS1-1 MS-LS1-2 MS-LS1-6
Hydroponics			
14. Introduction to Hydroponic Systems (4-12)	<ul style="list-style-type: none"> • Introduction to Hydroponic Systems • Plant Dynamics (circulation and nutrient uptake) • pH, Acidity, and Alkalinity Testing • Drawing Conclusions from Lecture and Examples 	4-LS1-1 4-PS3-4 5-PS3-1 5-LS1-1 5-LS2-1 MS-LS2-1 MS-LS2-4 MS-LS2-5 MS-ESS3-3 HS-LS1-2 HS-LS2-5	4-LS1-1 5-PS3-1 5-LS1-1 3-5-ETS1-1 MS-LS1-5 MS-LS2-1 MS-LS3-3 MS-ESS3-3 HS-LS2-7 HS-ESS2-6 HS-ESS3-4 HS-ETS1-1
15. Passive Hydroponic System (3-8)	<ul style="list-style-type: none"> • Introduction to Hydroponic Systems • Plant Dynamics (circulation and nutrient uptake) • pH, Acidity, and Alkalinity Testing 	3-LS4-3 4-LS1-1 4-PS3-4	3-LS1-1 3-LS4-3 4-LS1-1

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Lesson	Key Topics	State of AK	NGSS
	<ul style="list-style-type: none"> • Recording Scientific Data in Tables • Standardized Science Measurements • Small Scale construction of a Hydroponic System • Drawing Conclusions from Experimentation (hands-on, observation, and note-taking) 	5-PS3-1 5-LS1-1 5-LS2-1 MS-LS2-1 MS-LS2-4 MS-LS2-5 MS-ESS3-3 MS-ETS1-1	5-PS3-1 5-LS1-1 3-5-ETS1-1 MS-LS1-5 MS-LS2-1 MS-LS3-3 MS-ESS3-3 MS-ETS1-1
16. Hydroponic Growing Media (3-12)	<ul style="list-style-type: none"> • Hydroponic Systems • Plant Dynamics (circulation and nutrient uptake) • Growing Media (soil, water, other) • Recording Scientific Data in Tables • Standardized Science Measurements • Drawing Conclusions from Experimentation (hands-on, observation, and note-taking) 	3-5-ETS1-2 4-LS1-1 4-PS3-4 5-PS3-1 5-LS1-1 5-LS2-1 MS-LS2-1 MS-LS2-4 MS-LS2-5 MS-ESS3-3 MS-ETS1-2 HS-ESS3-4	3-LS1-1 3-LS4-4 4-LS1-1 5-LS1-1 3-5-ETS1-2 MS-LS1-5 MS-LS3-3 MS-ESS3-3 MS-ETS1-1 HS-LS1-3 HS-LS2-6 HS-ESS2-6 HS-ESS3-4 HS-ETS1-3
17. Setting Up the Floating Platform Hydroponic System (4-12)	<ul style="list-style-type: none"> • Hydroponic Systems • Plant Dynamics (circulation and nutrient uptake) • Plant Life Cycle • pH, Acidity, and Alkalinity Testing • Recording Scientific Data in Tables • Standardized Science Measurements • Medium Scale construction of a Hydroponic System • Drawing Conclusions from Experimentation (hands-on, observation, and note-taking) 	4-LS1-1 4-PS3-4 5-PS3-1 5-LS1-1 5-LS2-1 MS-LS2-1 MS-LS2-4 MS-LS2-5 MS-ESS3-3 MS-ETS1-4 HS-LS1-2 HS-LS2-5 HS-ESS3-4	4-LS1-1 5-PS3-1 5-LS1-1 3-5-ETS1-1 MS-LS1-5 MS-LS2-1 MS-ESS3-3 MS-ETS1-4 HS-LS1-3 HS-LS2-7 HS-ESS2-6 HS-ESS2-7 HS-ESS3-4 HS-ETS1-3

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Lesson	Key Topics	State of AK	NGSS
18. Setting Up the Nutrient Film Technique (NFT) System (4-12)	<ul style="list-style-type: none"> • Hydroponic Systems • Plant Dynamics (circulation and nutrient uptake) • pH, Acidity, and Alkalinity Testing • Recording Scientific Data in Tables • Standardized Science Measurements • Large Scale construction of a Hydroponic System • Drawing Conclusions from Experimentation (hands-on, observation, and note-taking) 	4-LS1-1 4-PS3-4 5-PS3-1 5-LS1-1 5-LS2-1 MS-LS2-1 MS-LS2-4 MS-LS2-5 MS-ESS3-3 MS-ETS1-4 HS-LS1-2 HS-LS2-5 HS-ESS3-4	4-LS1-1 5-PS3-1 5-LS1-1 3-5-ETS1-1 MS-LS1-5 MS-LS2-1 MS-ESS3-3 MS-ETS1-4 HS-LS1-3 HS-LS2-7 HS-ESS2-6 HS-ESS2-7 HS-ESS3-4 HS-ETS1-3
19. What? No Soil? (6-8)	<ul style="list-style-type: none"> • Hydroponic Systems • Plant Dynamics (circulation and nutrient uptake) • Recording Scientific Data in Tables • Standardized Science Measurements • Small Scale construction of a Hydroponic System • Drawing Conclusions from Experimentation (hands-on, observation, and note-taking) 	MS-LS2-1 MS-LS2-3 MS-LS2-4 MS-LS2-5 MS-ESS3-3 MS-ETS1-1	4-LS1-1 5-PS3-1 5-LS1-1 3-5-ETS1-1 MS-LS1-5 MS-LS2-1 MS-ESS3-3 MS-ETS1-1
20. Chena Hot Springs Growing Tower System (4-12)	<ul style="list-style-type: none"> • Hydroponic Systems • Plant Dynamics (circulation and nutrient uptake) • pH, Acidity, and Alkalinity Testing • Standardized Science Measurements • Large Scale construction of a Hydroponic System • Drawing Conclusions from Experimentation (hands-on, observation, and note-taking) 	4-LS1-1 4-PS3-4 5-PS3-1 5-LS1-1 5-LS2-1 MS-LS2-3 MS-LS2-5 MS-ESS3-3 MS-ETS1-4 HS-ESS3-4	4-LS1-1 5-LS1-1 5-ESS3-1 3-5-ETS1-1 MS-LS2-1 MS-LS3-3 MS-ETS1-4 HS-LS1-3 HS-LS2-7 HS-ESS2-6 HS-ESS3-4 HS-ETS1-3

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Aquaponics			
21. Setting Up the Aquaponic System (4-12)	<ul style="list-style-type: none"> • Introduction to Aquaponics (fish farming + hydroponics) • Plant Dynamics (circulation and nutrient uptake) • pH, Acidity, and Alkalinity Testing • Recording Scientific Data in Tables • Standardized Science Measurements • Medium Scale construction of an Aquaponic System • Drawing Conclusions from Experimentation (hands-on, observation, and note-taking) 	4-LS1-1 4-PS3-4 5-PS3-1 5-LS1-1 5-LS2-1 MS-LS2-1 MS-LS2-2 MS-LS2-4 MS-ESS3-3 MS-ETS1-4 HS-LS1-2 HS-LS2-5 HS-LS2-6 HS-ESS3-4	4-LS1-1 5-PS3-1 5-LS1-1 5-LS2-1 3-5-ETS1-1 MS-LS1-5 MS-LS2-2 MS-LS3-3 MS-ESS3-3 MS-ETS1-4 HS-LS1-3 HS-LS2-7 HS-LS4-5 HS-ESS2-6 HS-ESS2-7 HS-ESS3-4 HS-ETS1-3
22. Aquaponic Fish Care (4-12)	<ul style="list-style-type: none"> • Introduction to Aquaponics • Introduction to Fisheries (biology and care) • Water Quality and Monitoring • Plant Dynamics (circulation and nutrient uptake) • pH, Acidity, and Alkalinity Testing • Recording Scientific Data in Tables • Standardized Science Measurements • Small Scale construction of an Aquaponic System • Drawing Conclusions from Experimentation (hands-on, observation, and note-taking) 	4-LS1-1 4-PS3-4 5-PS3-1 5-LS1-1 5-LS2-1 MS-LS2-1 MS-LS2-2 MS-LS2-4 MS-ESS3-3 MS-ETS1-4 HS-LS1-2 HS-LS2-3 HS-LS2-5 HS-LS2-6 HS-ESS3-4	4-LS1-1 5-PS3-1 5-LS1-1 5-LS2-1 3-5-ETS1-1 MS-LS1-5 MS-LS2-2 MS-LS3-3 MS-ESS3-3 MS-ETS1-4 HS-LS1-3 HS-LS2-6 HS-LS2-7 HS-LS4-5 HS-ESS2-6 HS-ESS2-7 HS-ESS3-4 HS-ETS1-3

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Lesson	Key Topics	State of AK	NGSS
23. Exploring Aquaponics (K-2)	<ul style="list-style-type: none"> • Introduction to Aquaponics • Introduction to Fisheries (anatomy, biology, and care) • Water Quality and Monitoring • Plant Dynamics (circulation and nutrient uptake) • pH, Acidity, and Alkalinity Testing • Recording Scientific Data • Standardized Science Measurements • Small Scale construction of an Aquaponic System • Drawing Conclusions from Experimentation (hands-on, observation, and note-taking) 	K-LS1-1 K-ESS3-1 K-2-ETS1-2 1-LS1-1 2-PS1-4	K-LS1-1 K-ESS2-2 K-ESS3-1 1-LS1-1 1-LS1-2 1-ESS1-2 2-PS1-2 2-LS2-1 2-LS4-1 2-ESS2-2 K-2-ETS1-2
24. Exploring Aquaponics (3-5)	<ul style="list-style-type: none"> • Introduction to Aquaponics • Introduction to Fisheries (anatomy, biology, and care) • Water Quality and Monitoring • Plant Dynamics (circulation and nutrient uptake) • pH, Acidity, and Alkalinity Testing • Recording Scientific Data • Standardized Science Measurements • Small Scale construction of an Aquaponic System • Drawing Conclusions from Experimentation (hands-on, observation, and note-taking) 	3-LS3-2 3-5-ETS1-3 4-LS1-1 4-PS3-4 5-PS3-1 5-LS1-1 5-LS2-1	3-LS1-1 3-LS3-2 3-LS4-3 3-LS4-4 4-LS1-1 5-PS3-1 5-LS1-1 5-LS2-1 3-5-ETS1-1
Composting			
25. Composting Worms (K-8)	<ul style="list-style-type: none"> • Introduction to Composting • Life Cycle and Anatomy of Worms • Decomposition of Vegetation • Composition of Compost (Macro and Micro Organisms, Oxygen and Aeration, Temperature) • Recording Scientific Data • Standardized Science Measurements • Medium Scale construction of a Compost System • Drawing Conclusions from Experimentation (hands-on, observation, and note-taking) 	K-LS1-1 K-ESS3-1 K-2-ETS1-2 1-LS1-1 2-LS4-1 3-LS4-3 3-5-ETS1-1 4-LS1-2 5-PS3-1 5-LS2-1 MS-LS1-3 MS-LS1-8 MS-LS2-1 MS-LS2-2	K-LS1-1 K-ESS2-2 K-ESS3-1 1-LS1-1 1-LS1-2 2-LS4-1 K-2-ETS1-1 3-LS1-1 3-LS3-2 3-LS4-3 3-LS4-4 4-LS1-1 4-LS1-2 5-PS3-1

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		MS-LS2-5 MS-ESS3-3 MS-ETS1-1	5-LS2-1 3-5-ETS1-1 MS-LS1-1 MS-LS1-5 MS-LS1-7 MS-LS2-4 MS-LS3-3 MS-ESS3-3 MS-ETS1-1
26. The Rotten Truth (3-5)	<ul style="list-style-type: none"> • Introduction to Composting • Life Cycle and Anatomy of Worms • Decomposition of Vegetation • Biodegradation • Composition of Compost (Macro and Micro Organisms, Oxygen and Aeration, Temperature) • Recording Scientific Data • Standardized Science Measurements • Small Scale construction of a Compost System • Drawing Conclusions from Experimentation (hands-on, observation, and note-taking) 	3-LS4-3 3-5-ETS1-3 4-LS1-1 5-PS3-1 5-LS2-1	3-LS1-1 3-LS3-2 3-LS4-3 3-LS4-4 4-LS1-1 4-LS1-2 5-PS3-1 5-LS2-1 3-5-ETS1-1