

Supplementary

Monitoring and prediction of wild blueberry phenology using a multispectral sensor

Table S1A. Rankings of an RF classifier on the best-performing indices for each phenological stage and parameter using the micasense. Performance was evaluated using outputs from the variable importance chart. Percentages represent the performance of the individual vegetative indices in achieving that outcome. Indices have been arranged in order of the best index to the least performing index along with its corresponding percentage.

Bud break (F1)		
Parameter	Rank	Percentage (%)
Yield (g.m ⁻²)	GLI, VARI, ENDVI, NDVI, NDRE, GRVI	100, 55, 18, 12, 5, 0
Leaf area index	NDVI, NDRE, ENDVI, VARI, GLI, GRVI	100, 82, 50, 10, 8, 0
Plant height (cm)	NDVI, ENDVI, VARI, NDRE, GRVI, GLI	100, 88, 58, 42, 35, 0
Floral bud number	NDRE, ENDVI, NDVI, GRVI, VARI, GLI	100, 92, 80, 45, 18, 0
Floral bud stage	GLI, ENDVI, VARI, GRVI, NDRE, NDVI	100, 40, 28, 18, 13, 0
Vegetative bud number	ENDVI, GLI, NDVI, NDRE, GRVI, VARI	100, 35, 28, 10, 1, 0
Vegetative bud stage	GLI, ENDVI, VARI, GRVI, NDRE, NDVI	100, 45, 35, 28, 12, 0
Tight cluster (F2/F3)		
Parameter	Rank	Percentage (%)
Yield (g.m ⁻²)	ENDVI, NDRE, NDVI, VARI, GRVI, GLI	100, 72, 65, 58, 20, 0
Leaf area index	NDRE, NDVI, GRVI, GLI, ENDVI, VARI	100, 35, 25, 20, 12, 0
Plant height (cm)	NDVI, NDRE, ENDVI, VARI, GRVI, GLI	100, 75, 62, 39, 38, 0
Floral bud number	VARI, GRVI, NDRE, ENDVI, GLI, NDVI	100, 90, 15, 10, 5, 0
Floral bud stage	NDRE, GLI, VARI, NDVI, GRVI, ENDVI	100, 39, 38, 29, 8, 0
Vegetative bud number	VARI, ENDVI, NDRE, NDVI, GLI, GRVI	100, 95, 60, 52, 28, 0
Vegetative bud stage	VARI, GLI, GRVI, NDRE, NDVI, ENDVI	100, 92, 85, 30, 8, 0
Early/late bud (F4/F5)		
Parameter	Rank	Percentage (%)
Yield (g.m ⁻²)	VARI, GRVI, GLI, NDVI, NDRE, ENDVI	100, 90, 78, 65, 40, 0
Leaf area index	NDRE, NDVI, GRVI, GLI, ENDVI, VARI	100, 35, 25, 20, 15, 0
Plant height (cm)	ENDVI, NDVI, NDRE, GLI, VARI, GRVI	100, 75, 27, 15, 13, 0
Floral bud number	GLI, ENDVI, VARI, GRVI, NDRE, NDVI	100, 78, 50, 48, 18, 0
Floral bud stage	GRVI, VARI, GLI, ENDVI, NDVI, NDRE	100, 78, 38, 15, 12, 0
Vegetative bud number	ENDVI, NDRE, VARI, NDVI, GLI, GRVI	100, 65, 20, 19, 18, 0
Vegetative bud stage	VARI, GRVI, GLI, NDRE, ENDVI, NDVI	100, 90, 38, 23, 5, 0
Bloom (F6/F7)		
Parameter	Rank	Percentage (%)
Yield (g.m ⁻²)	ENDVI, NDVI, NDRE, VARI, GLI, GRVI	100, 45, 23, 10, 3, 0
Leaf area index	NDVI, NDRE, ENDVI, GLI, GRVI, VARI	100, 95, 63, 60, 10, 0
Plant height (cm)	VARI, GRVI, NDRE, NDVI, ENDVI, GLI	100, 60, 35, 22, 15, 0
Floral bud number	VARI, GRVI, GLI, ENDVI, NDVI, NDRE	100, 70, 67, 50, 25, 0
Floral bud stage	NDVI, NDRE, GRVI, ENDVI, VARI, GLI	100, 48, 38, 25, 20, 0
Vegetative bud number	NDRE, GLI, NDVI, GRVI, VARI, ENDVI	100, 72, 60, 50, 43, 0
Vegetative bud stage	ENDVI, GLI, VARI, GRVI, NDRE, NDVI	100, 74, 18, 15, 8, 0

Fruit set (F8)		
Parameter	Rank	Percentage (%)
Yield (g.m ⁻²)	ENDVI, GRVI, GLI, NDRE, VARI, NDVI	100, 85, 30, 28, 25, 0
Leaf area index	VARI, GLI, GRVI, NDVI, NDRE, ENDVI	100, 95, 80, 18, 10, 0
Plant height (cm)	GLI, VARI, GRVI, ENDVI, NDVI, NDRE	100, 48, 48, 22, 3, 0
Floral bud number	GLI, GRVI, VARI, ENDVI, NDVI, NDRE	100, 58, 45, 23, 22, 0
Floral bud stage	VARI, GLI, GRVI, ENDVI, NDRE, NDVI	100, 78, 65, 60, 40, 0
Vegetative bud number	GRVI, VARI, ENDVI, GLI, NDVI, NDRE	100, 95, 93, 83, 20, 0
Vegetative bud stage	GLI, ENDVI, VARI, NDRE, GRVI, NDVI	100, 75, 40, 27, 27, 0

Table S1B. Rankings of an **SMLR** and **KNN** classifier on the best-performing indices for each phenological stage and parameter using the micasense. Performance was evaluated using outputs from the variable importance chart. Percentages represent the performance of the individual vegetative indices in achieving that outcome. Indices have been arranged in order of the best index to the least performing index along with its corresponding percentage.

Bud break (F1)		
Parameter	Rank	Percentage (%)
Yield (g.m ⁻²)	GLI, VARI, GRVI, NDRE, NDVI, ENDVI	100, 72, 60, 22, 8, 0
Leaf area index	NDRE, NDVI, ENDVI, GLI, GRVI, VARI	100, 90, 82, 10, 4, 0
Plant height (cm)	NDRE, NDVI, ENDVI, GRVI, VARI, GLI	100, 95, 75, 68, 27, 0
Floral bud number	NDRE, NDVI, ENDVI, GRVI, VARI, GLI	100, 75, 72, 48, 15, 0
Floral bud stage	GLI, VARI, GRVI, NDRE, ENDVI, NDVI	100, 87, 82, 30, 5, 0
Vegetative bud number	ENDVI, NDVI, NDRE, VARI, GRVI, GLI	100, 70, 15, 3, 2, 0
Vegetative bud stage	GLI, VARI, GRVI, NDRE, ENDVI, NDVI	100, 87, 82, 30, 5, 0

Tight cluster (F2/F3)		
Parameter	Rank	Percentage (%)
Yield (g.m ⁻²)	GRVI, NDRE, NDVI, VARI, ENDVI, GLI	100, 82, 78, 72, 45, 0
Leaf area index	GRVI, VARI, GLI, ENDVI, NDRE, NDVI	100, 68, 44, 20, 15, 0
Plant height (cm)	NDRE, NDVI, ENDVI, VARI, GLI, GRVI	100, 95, 80, 5, 5, 0
Floral bud number	GRVI, VARI, NDRE, GLI, NDVI, ENDVI	100, 85, 30, 15, 10, 0
Floral bud stage	GLI, GRVI, VARI, ENDVI, NDRE, NDVI	100, 90, 78, 42, 22, 0
Vegetative bud number	ENDVI, NDRE, NDVI, GLI, VARI, GRVI	100, 68, 50, 48, 15, 0
Vegetative bud stage	GLI, GRVI, VARI, ENDVI, NDRE, NDVI	100, 90, 78, 45, 23, 0

Early/late bud (F4/F5)		
Parameter	Rank	Percentage (%)
Yield (g.m ⁻²)	VARI, GRVI, GLI, NDVI, NDRE, ENDVI	100, 100, 100, 90, 70, 0
Leaf area index	GRVI, VARI, GLI, ENDVI, NDRE, NDVI	100, 70, 44, 20, 15, 0
Plant height (cm)	ENDVI, NDVI, NDRE, GLI, GRVI, VARI	100, 75, 50, 38, 28, 0
Floral bud number	GLI, GRVI, ENDVI, NDVI, NDRE, VARI	100, 65, 55, 45, 18, 0
Floral bud stage	GRVI, VARI, GLI, NDVI, NDRE, ENDVI	100, 95, 92, 65, 45, 0
Vegetative bud number	ENDVI, NDRE, NDVI, GLI, VARI, GRVI	100, 67, 50, 48, 15, 0
Vegetative bud stage	GRVI, VARI, GLI, NDVI, NDRE, ENDVI	100, 95, 92, 65, 45, 0

Bloom (F6/F7)		
Parameter	Rank	Percentage (%)
Yield (g.m ⁻²)	GLI, ENDVI, NDVI, GRVI, NDRE, VARI	100, 95, 80, 79, 50, 0

Leaf area index	NDRE, NDVI, ENDVI, GLI, GRVI, VARI	100, 100, 90, 78, 28, 0
Plant height (cm)	GRVI, NDRE, NDVI, VARI, GLI, ENDVI	100, 85, 30, 27, 13, 0
Floral bud number	NDRE, GRVI, NDVI, GLI, VARI, ENDVI	100, 98, 82, 70, 50, 0
Floral bud stage	ENDVI, NDRE, NDVI, GLI, GRVI, VARI	100, 95, 82, 58, 25, 0
Vegetative bud number	GLI, GRVI, NDRE, NDVI, ENDVI, VARI	100, 82, 67, 50, 32, 0
Vegetative bud stage	ENDVI, NDRE, NDVI, GLI, GRVI, VARI	100, 95, 82, 58, 25, 0

Fruit set (F8)		
Parameter	Rank	Percentage (%)
Yield (g.m ⁻²)	ENDVI, NDRE, NDVI, GRVI, GLI, VARI	100, 90, 78, 75, 50, 0
Leaf area index	GRVI, VARI, GLI, NDVI, ENDVI, NDRE	100, 95, 92, 35, 22, 0
Plant height (cm)	GRVI, VARI, GLI, ENDVI, NDRE, NDVI	100, 85, 79, 8, 4, 0
Floral bud number	NDVI, GLI, NDRE, VARI, GRVI, ENDVI	100, 68, 50, 45, 35, 0
Floral bud stage	NDRE, GRVI, VARI, NDVI, ENDVI, GLI	100, 58, 50, 40, 10, 0
Vegetative bud number	GRVI, VARI, GLI, ENDVI, NDVI, NDRE	100, 90, 85, 75, 25, 0
Vegetative bud stage	NDRE, GRVI, VARI, NDVI, ENDVI, GLI	100, 58, 50, 40, 10, 0



Figure S1. Ground Control Point deployed at the Kemptown Trial site before aerial surveys.