Supplemental Fig. S1. (a) Multispectral image showing the four replicate treatments of eight varieties within standard irrigated (below) and non-irrigated (above) plots; (b) the ground-based platform used for proximal sensing; (c) aerial imaging using unmanned aerial system (the inset shows multispectral and thermal camera mounted on the platform); (d) sample image of non-irrigated plots; and (e) sample image of irrigated plots. Images not at same scale.
Supplemental Fig. S2. Sample UAS-based (a) false-color original (NIR, G, B as R, G, B), (b) pseudo-color green normalized difference vegetation index; and (c) pseudo-color thermal images of field plots at fruit development growth stage (D3). The color scale in GNDVI image represents range of GNDVI values; while color in thermal image represents temperature in degree Celsius. The images were acquired at 100 m AGL.
Supplemental Fig. S3. Sample proximal system-based (a) false-color original (NIR, G, B as R, G, B), (b) pseudo-color green normalized difference vegetation index; and (c) pseudo-color thermal images of a field plot. The color scale in GNDVI image represents range of GNDVI values; while color in thermal image represents temperature in degree Celsius. The images were acquired at 3.5 m AGL.

Supplemental Fig. S4. Correlation between Crop Scan-based normalized difference vegetation index (CS. NDVI) with unmanned aerial system-based green normalized difference vegetation index (UAS.GNDVI) at D2 data collection stage.
Supplemental Fig. S5. Correlation between proximal green normalized difference vegetation index (PRO.GNDVI) with unmanned aerial system-based canopy temperature (UAS.T) at D3 data collection stage.

Supplemental Table S1. Details of quinoa varieties studied in this research.

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>PI Number USDA</th>
<th>Seed Source</th>
<th>Origin</th>
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<td>USDA</td>
<td>NA</td>
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<td>V2</td>
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<td>Ames 13756</td>
<td>USDA</td>
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<td>-</td>
<td>Mario Tapia (Perú)</td>
<td>Perú</td>
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<td>PI 614886</td>
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Supplemental Table S2. Statistical analysis of different features extracted from image data (D1 and D2) among varieties. Different letters represent statistical difference among varieties at the same irrigation rate. Bold letters highlight significant mean differences within a variety between standard irrigation (SI) and non-irrigation (NI) treatments. The features are as follows: stomatal conductance-SC; normalized difference vegetation index-NDVI; water band index-WBI; green NDVI-GNDVI; Crop Scan-CS, and proximal sensing-PRO.

<table>
<thead>
<tr>
<th>Variety</th>
<th>SC (mmol m⁻² s⁻¹)</th>
<th>PRO.GNDVI</th>
<th>PRO.T (°C)</th>
<th>SC (mmol m⁻² s⁻¹)</th>
<th>CS.NDVI</th>
<th>CS.WBI</th>
<th>CS.GNDVI</th>
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<tr>
<td>V1</td>
<td>312.79</td>
<td>284.75 a</td>
<td>0.23 ab</td>
<td>0.17 bc</td>
<td>16.06 a</td>
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<td>V2</td>
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<td>337.25 a</td>
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<td>0.16 bc</td>
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<td>0.78 bc</td>
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<td>15.67 a</td>
<td>19.29 a</td>
<td>1.83 a</td>
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<td>350.73 a</td>
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<td>17.21 a</td>
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<td>0.77 c</td>
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Supplemental Table S3. Statistical analysis of different features extracted from image data (D3 and D4) among varieties. Different letters represent statistical difference among varieties at the same irrigation rate. Bold letters highlight significant mean differences within a variety between standard irrigation (SI) and non-irrigation (NI) treatments. The features are as follows: stomatal conductance-SC; normalized difference vegetation index-NDVI; water band index-WBI; green NDVI-GNDVI; temperature-T; Crop Scan-CS, proximal sensing-PRO; and unmanned aerial system-UAS.

<table>
<thead>
<tr>
<th>Variety</th>
<th>SC (mmol m⁻² s⁻¹)</th>
<th>CS.NDVI</th>
<th>CS.WBI</th>
<th>CS.GNDVI</th>
<th>PRO.GNDVI</th>
<th>PRO.T (°C)</th>
<th>UAS.GNDVI</th>
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