

Supplementary Material

Table 1. Agronomic measurements for potato crop at Skaff West Bekaa (Lebanon) (average of three samples for each date).

| Date | 5/7/2018 | 2/7/2018 |
|---|----------|----------|
| Location | Skaff | Mikse |
| Crop | Potato | Potato |
| AGFW* (kg/m ²) | 1.34 | 1.17 |
| AGDW* (kg/m ²) | 0.24 | 0.22 |
| Tuber fresh weight (kg/m ²) | 3.00 | 4.36 |
| Tuber fresh weight (tha) | 30.00 | 43.60 |
| Tuber dry weight (kg/m ²) | 0.74 | 0.99 |
| Tuber dry weight (t/ha) | 7.37 | 9.93 |
| % Moisture of the tubers | 75.25 | 77.23 |
| AGDW/TBW* | 0.76 | 0.77 |
| % Moisture in the Shoot | 82.33 | 82.00 |

*AGFW: Above Ground Fresh Weight, AGDW: Above Ground Dry Weight. TBW: Total Biomass Weight (above-ground dry weight and dry tuber weight)

Table 2. Agronomic measurements for wheat at Skaff West Bekaa (Lebanon) site (average of three samples for each date).

| Date | 6/13/2018 | 6/20/2018 | 6/20/2018 |
|---|-----------|-----------|---------------|
| Location | Skaff | Skaff | Mikse Village |
| Crop | Wheat | Wheat | Wheat |
| Subsample wet grains weight (kg /m ²) | 0.050 | 0.048 | 0.049 |
| Subsample dry grains weight (kg /m ²) | 0.043 | 0.043 | 0.042 |
| Total number of spikes | 67 | 108 | 129 |
| Number of Subsample spikes | 10 | 10 | 10 |
| Total Grain weight (kg/ m ²) | 0.287 | 0.463 | 0.540 |
| Average Grain weight (kg/m ²) | 0.290 | 0.460 | 0.540 |
| Average Grain weight (t/ha) | 2.860 | 4.640 | 5.410 |
| Average AGDW (kg/m ²) | 0.840 | 1.520 | 2.600 |
| AGDW/TBW | 0.30 | 0.20 | 0.20 |
| Average grain moisture content (%) | 15 | 12 | 15 |

Table 3. Agronomic measurements for potato at AREC Bekaa (Lebanon) site.

| Date | FW Samples (t/ha) | | DW* Samples (t/ha) | | FW* Tubers (t/ha) | | DW* Tubers (t/ha) | | Tubers MC* (%) | | HI* | |
|-----------|-------------------|--------|--------------------|--------|-------------------|--------|-------------------|--------|----------------|--------|--------|--------|
| | plot 1 | plot 2 | plot 1 | plot 2 | plot 1 | plot 2 | plot 1 | plot 2 | plot 1 | plot 2 | plot 1 | plot 2 |
| 30/4/2020 | 3.5 | 4.3 | 0.3 | 0.4 | — | — | — | — | — | — | — | — |
| 6/5/2020 | 7.0 | 8.2 | 0.8 | 0.8 | — | — | — | — | — | — | — | — |
| 13/5/2020 | 15.3 | 20.3 | 1.5 | 2.0 | — | — | — | — | — | — | — | — |
| 21/5/2020 | 44.8 | 37.0 | 6.3 | 5.0 | — | — | — | — | — | — | — | — |
| 27/5/2020 | 52.0 | 69.9 | 6.3 | 9.9 | — | — | — | — | — | — | — | — |
| 2/6/2020 | 68.5 | 56.0 | 7.8 | 6.5 | — | — | — | — | — | — | — | — |
| 9/6/2020 | 77.8 | 95.1 | 9.3 | 9.4 | 29.0 | 24.7 | 4.7 | 3.6 | 83.7 | 85.5 | 0.4 | 0.3 |
| 16/6/2020 | 107.0 | 87.9 | 13.9 | 10.0 | 42.5 | 26.3 | 7.1 | 3.7 | 83.3 | 85.9 | 0.4 | 0.3 |
| 23/6/2020 | 130.5 | 152.9 | 19.0 | 19.2 | 71.3 | 77.2 | 12.5 | 11.9 | 82.5 | 84.6 | 0.6 | 0.5 |
| 29/6/2020 | 188.3 | 208.1 | 26.4 | 30.0 | 111.9 | 118.0 | 26.4 | 20.6 | 76.4 | 82.6 | 0.6 | 0.6 |

| | | | | | | | | | | | | |
|-----------|-------|-------|------|------|-------|-------|------|------|------|------|-----|-----|
| 7/7/2020 | 171.8 | 164.8 | 28.6 | 25.8 | 122.6 | 112.9 | 23.3 | 20.3 | 81.0 | 82.0 | 0.7 | 0.7 |
| 13/7/2020 | 160.2 | 116.1 | 25.4 | 14.8 | 110.2 | 76.0 | 20.8 | 12.9 | 81.2 | 83.1 | 0.7 | 0.7 |
| 22/7/2020 | – | – | – | – | 134.3 | 100.8 | 20.8 | 12.9 | 84.5 | 87.2 | – | – |
| 28/7/2020 | – | – | – | – | 119.1 | 108.9 | 21.4 | 20.7 | 82.0 | 81.0 | – | – |

*where DW: Dry Weight, FW: Fresh Weight, MC: Moisture Content, HI: Harvest Index

Table S4. At site cloud-free Landsat imagery used in this study, with the respective date, L7 (Landsat 7), L8 (Landsat 8).

| Study Site | Dates of Images (dd/mm) |
|------------------------------|--|
| Skaff Bekaa (Lebanon) | 2017 |
| | L8: 02/05, 21/02, 24/03, 09/04, 25/04, 11/05, 27/05, 12/06,28/06,14/07,30/07,15/08,31/08,16/09,02/10,18/10,03/11 |
| | L7:17/04,03/05,04/06,07/06,22/07,07/08,23/08,08/09,24/09,27/11 |
| | 2018 |
| AREC Bekaa (Lebanon) | L8:24/02,11/03,12/04,14/05,15/06,01/07,05/07,17/07,02/08,18/08,03/09,19/09,06/10 |
| | L7:16/02,03/03,04/04,22/05,07/06,23/06,09/07,26/08,27/09,13/10,29/10 |
| | 2020 |
| São Desidério (Brazil) | L8:02/04,18/04,04/05,20/05,05/06,21/06,07/07,23/07,08/08,24/08 |
| | L7:26/04,12/05,28/05,13/06,29/06,15/07,31/07,16/08 |
| | 2015 |
| Albacete (Spain) | L8: 04/07,09/05,25/05,10/06,28/07,29/08,30/09,16/10,01/11 |
| | L7: 15/04,17/05,02/06,18/06,04/07,20/07,05/08,06/09,22/09,08/10,24/10,09/11 |
| | 2016 |
| Albacete (Spain) | L8:09/04,25/04,11/05,27/05,14/07,30/07,23/08,02/10,18/10,03/11 |
| | L7: 17/04,03/05,01/05,06/07,22/07,23/08,08/09,24/09,26/10 |
| | 2017 |
| | L8:03/01,04/02,24/02,27/02,08/03,15/03,24/03,31/03,09/04,16/04,25/04,02/05,11/05,18/05,27/05,03/06,12/06,19/06,28/06,05/07,14/07,21/07,30/07 |
| Albacete (Spain) | L7:11/01,03/02,28/02,07/03,23/03,01/04,08/04,17/04,24/04,03/05,10/05,19/05,26/05,04/06,11/06,20/06,27/06,06/07,03/07,22/07,29/07 |
| | 2018 |
| | L8: 06/01,13/01,22/01,29/01,07/02,14/02,11/03,18/03,27/03,03/04,12/04,19/04,28/04,05/05,14/05,21/05,30/05,15/06,22/06,01/07 |
| Albacete (Spain) | L7:05/01,14/01,30/01,15/02,22/02,19/03,26/03,04/04,20/04,27/04,06/05,13/05,22/05,29/05,07/06,14/06,23/06,30/06,09/07 |

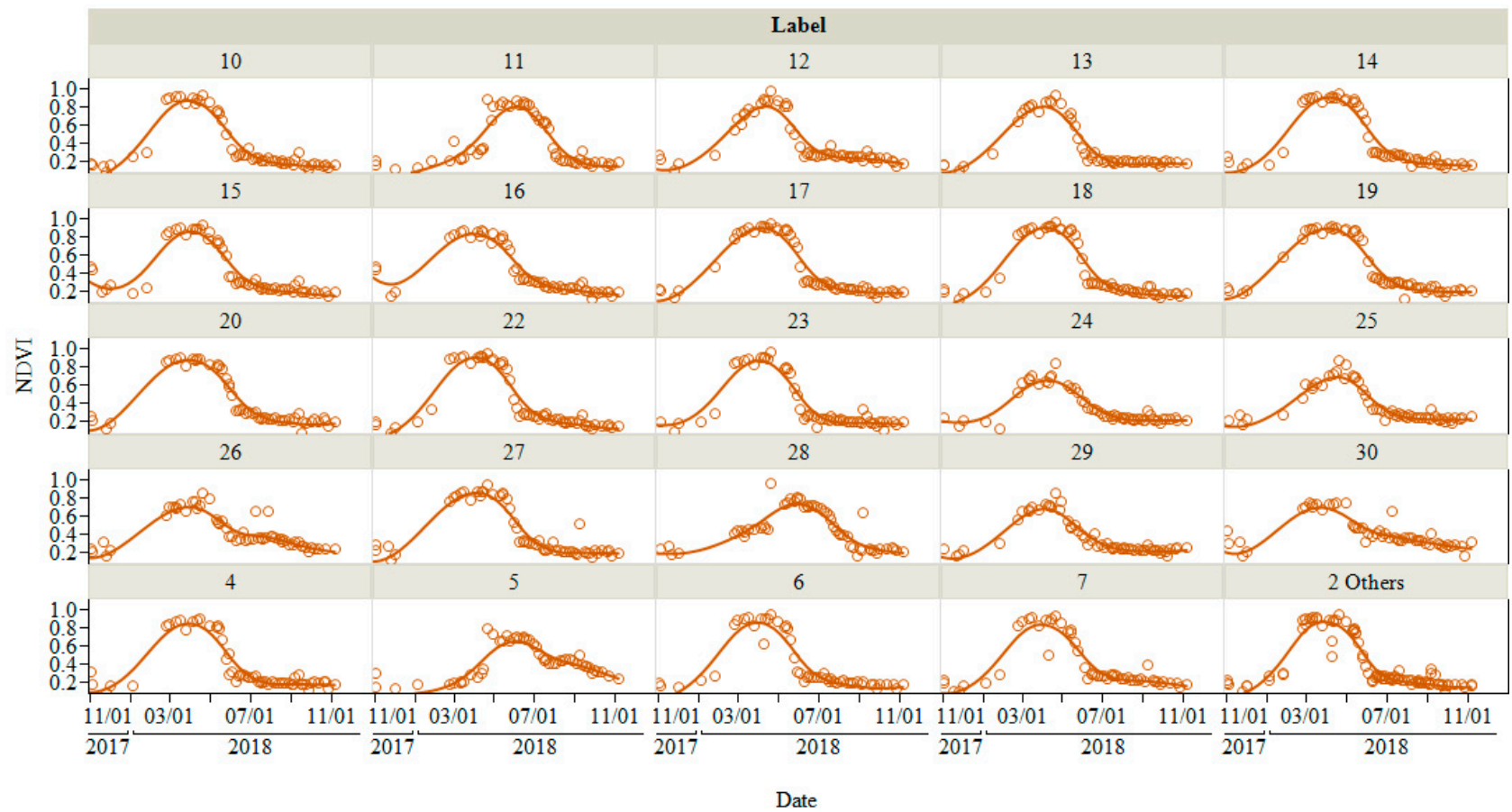


Figure 1. Wheat-fields NDVI time series Plots for winter 2017-2018 season.

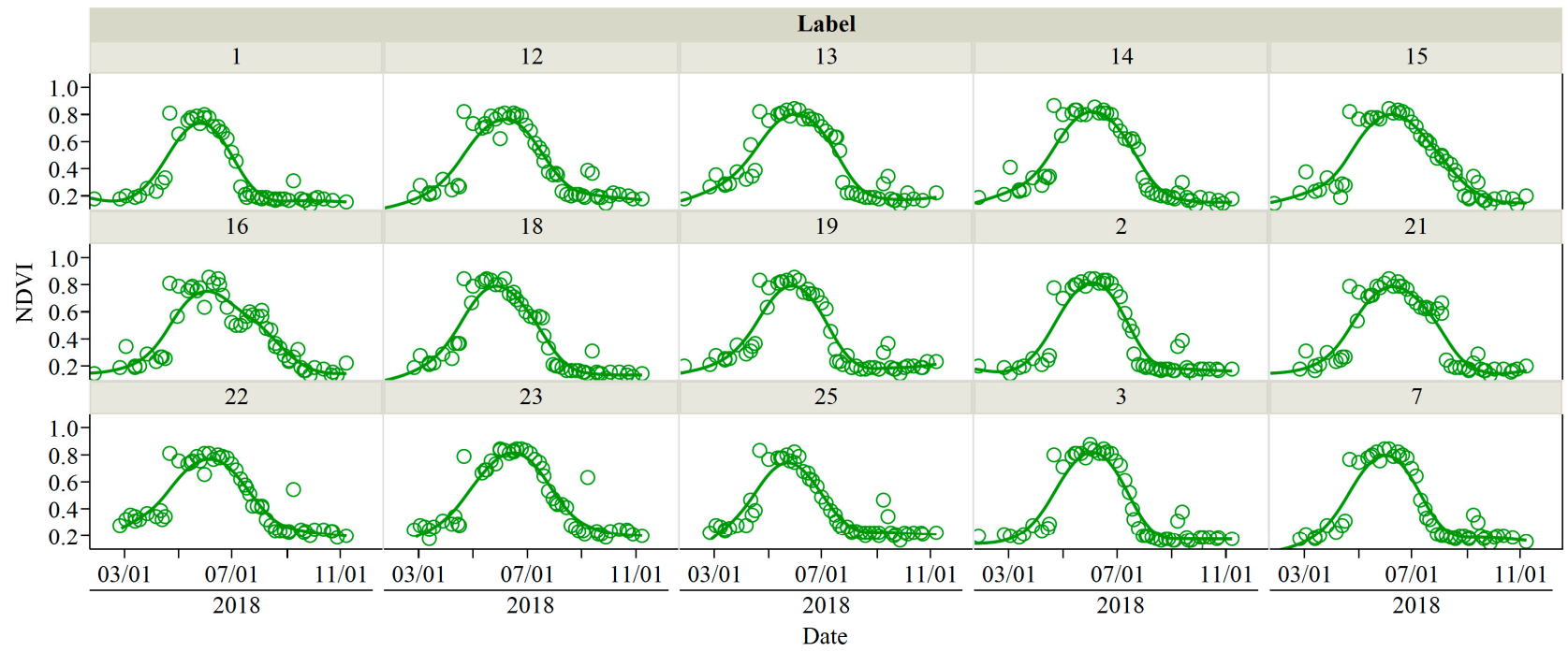


Figure S2. Potato fields NDVI time series plots for the summer 2018 season.

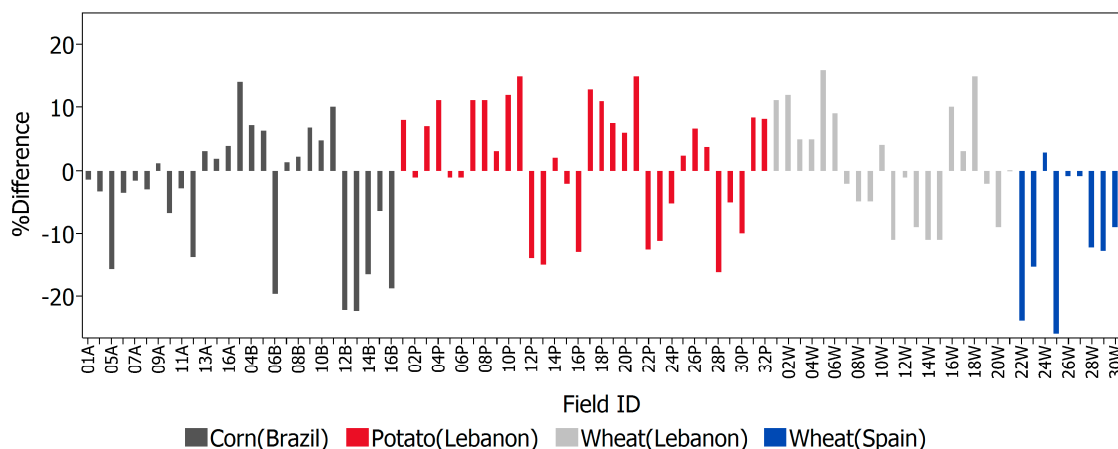


Figure 3. Percentage deviation (%) of modeled yield from the actual yield for the analyzed crops at each of the studied sites.

Figure S4 shows that simulations of temperature Stress (TS) at a hypothetical fixed air temperature of 28°C, showed an increase in TS by varying upper limit of stomatal activity (°C) (T_H) between 30 and 50°C and the optimum conductance temperature (°C) (K_T) between 18 and 28°C. A 2°C change in T_H can change TS by an average of 0.5%. A 2°C change in K_T can change TS by an average of 5.7%. The fixed values of T_H and K_T used in the model fall within the reported range provided in literature. With the simulated TS results, it can be deduced that both values would have had a low uncertainty for the crop yield estimation. Of course model performance could be better with optimized T_H and K_T values specific to each crop type.

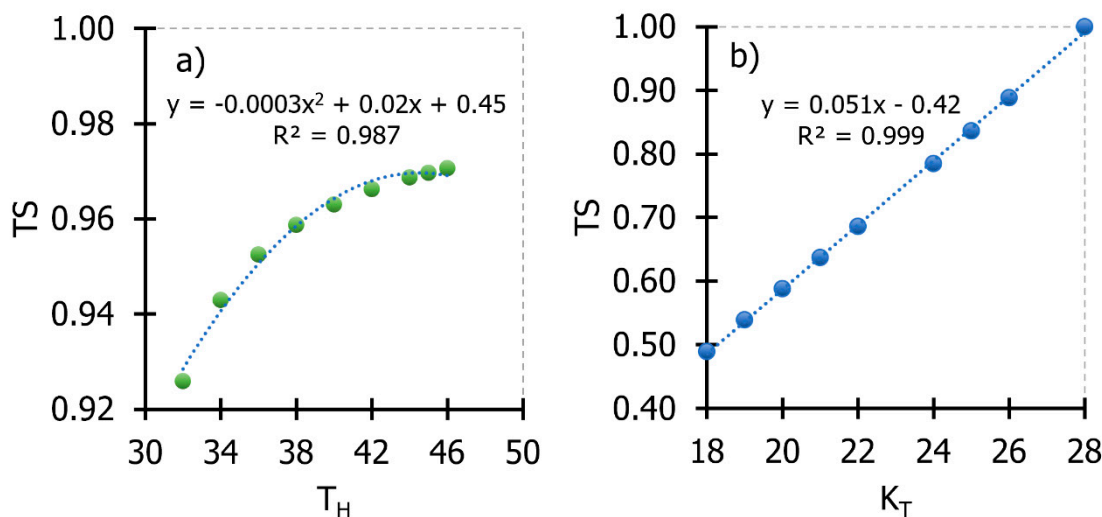


Figure 4. Simulations of temperature stress (TS) at a fixed daily air temperature of (28°C) as a function of: a) the upper limit of stomatal activity (°C) (T_H) and b) the optimum conductance temperature (°C) (K_T).