Effects of regionally applied heating on the respiration of wild type and transgenic soybean (*Glycine max*) plants grown under ambient and elevated CO$_2$ environments

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Nocturnal dark respiration (R$_n$) in wild type and transgenic soybean plants grown at SoyFACE research facility, Illinois, USA under ambient and elevated CO$_2$ conditions was examined in this study. Transgenic plants were transformed to overexpress a key Calvin cycle enzyme sedoheptulose-1,7-bisphosphatase (SBP) which is thought to improve yield in the field by at least 11%. Heating was applied using infrared heaters mounted 1.2 m above the plants in the field during the growing season of 2015 summer and R$_n$ measurements taken for wild type and SBP overexpressors at ambient and elevated CO$_2$ plots from V4 to R6 developmental stages. The objective was to study the effects of elevated CO$_2$ of approximately 585 μmol mol$^{-1}$ and +3.5 increase in temperature on wildtype and transgenic SBP plants. Measurements were recorded at growth and constant temperature for both varieties. Experimental plants were transferred to a controlled growth chamber at V4 and R6 developmental stages and the temperature responses examined from 15 to 40°C. Specific leaf area (SLA) and its relations to R$_n$ were also determined. Results indicate that SLA decreased significantly relative to control in the wild type and transgenic soybean plants by R6. Differential responses of R$_n$ to ambient and elevated CO$_2$ treatments were observed in both plants. In addition, results indicate that R$_n$ declined generally in both varieties under elevated temperature. Lower R$_n$ was attributed to temperature acclimation.

Key words: Dark respiration, soybean, ambient CO$_2$, elevated CO$_2$, transgenic plant, sedoheptulose-1,7-bisphosphatase (SBP), heating, acclimation.

INTRODUCTION

With changing environmental conditions due to global warming, plants experience variations in photosynthesis. These variations can be short-term or long-term and affect metabolic processes. In the future, the effects of
global warming may become more pronounced due to the continuous rise in greenhouse gases (Meehl et al., 2005). Additionally, the dominant anthropogenic greenhouse gas, atmospheric CO$_2$ concentrations is expected to rise to 600 ppm by 2050 (IPCC, 2013). The average surface temperature is also projected to increase by 5°C by the end of the 21st century (IPCC, 2013). Compared to the response at current ambient CO$_2$ concentrations (400 ppm, aCO$_2$), elevated CO$_2$ particularly in combination with high temperature has profound effects on the growth and physiology of plants and can lead to abiotic conditions such as drought and ultimately low crop yield (Xu et al., 2015).

Respiration is necessary for the maintenance of biosynthesis and cellular functions (Atkin et al., 2006). These ensure that the energy needed for plant growth and survival during abiotic stresses is available. Respiration lowers the production of harmful reactive oxygen species from these stresses and also contributes to carbon allocation. As a result, the photosynthetic activity in particular, sucrose synthesis is influenced by respiration. In addition, the xanthophyll and glutathione protective cycles are regulated by respiration with ascorbate produced. These ensure that the plant is equipped with strong defense mechanisms against the deleterious effects of abiotic and biotic stresses such as pathogen attack (Atkin et al., 2005).

Transgenic approaches are increasingly being used to improve crop yields for more sustainable food production. For these approaches to be successful, it is pertinent to understand the physiology and cellular function of the plant of interest. The physiology of soybean is well known and understood. Photosynthetic regulation studied in the plant revealed that temperature and elevated CO$_2$ affect its photosynthesis and yield (Hay, 2012; Rosenthal et al., 2011; Ruiz-Vera et al., 2013). Specifically it was shown that, photosynthesis is limited by ribulose-1,5-bisphosphate (RuBP) regeneration (Zhu et al., 2007; Rosenthal et al., 2011). Theoretically, if photosynthesis is limited by RuBP generation as a result of rise in CO$_2$ and temperature, attempt to transgenically modify the Calvin cycle in other to increase the rates of RuBP regeneration, should improve photosynthesis (Bernacchi et al., 2003). Recently, a key enzyme involved in RuBP regeneration in the Calvin Cycle Sedoheptulose-1,7-bisphosphatase (SBP) was shown to influence photosynthesis as CO$_2$ rises (Zhu et al., 2007). There is evidence that, overexpression of the enzyme increases the yield of tobacco and soybean in the field (Hay, 2012; Rosenthal et al., 2011). However, respiration in these transgenic species has not been explored in relation to changes in growth CO$_2$.

Elevated atmospheric CO$_2$ is believed to potentially increase temperature thereby increasing respiration (Lewis et al., 1999). Plant respiration is thought to contribute up to 65% of atmospheric CO$_2$, with the remaining generated from soil respiration (Atkin et al., 2005). The focus of the research presented here is however on leaf respiration.

Respiration is therefore largely affected by temperature. The relationship between plant respiration and temperature response is an exponential curve that involves a constant Q$_{10}$, that is a proportional change in temperature with 10°C variation (Atkin et al., 2005). In addition, plants can acclimate to temperature upon long-term exposure. This result is in the adjustment of the carbon respired and changes in rate of photosynthesis. This effect termed thermal acclimation, is fully or partly reversible when optimal growth conditions return (Bunce, 2007). From literature, some of the causes of acclimation to temperature include; availability of carbohydrates, nitrogen, decrease in stomatal resistance and evaporative cooling (Baker et al., 1992; Clark and Menary, 1980; Evans and Poorter, 2001; Song et al., 2014; Wolf et al., 1990).

Although many papers have considered leaf respiration in different species, thereby conflicting reports. Respiration has been reported to increase, decrease or remain unchanged in response to various abiotic stresses (Gifford, 1995; Gonzalez-Meler et al., 1996; Leakey et al., 2009b; Lewis et al., 1999; Ziska and Bunce, 1998). Despite the huge literature available, no work has been done to compare the dark respiration of a wild type plant with a transgenic one grown in the field. In particular, there is need to understand the effects of elevated CO$_2$ and temperature on the dark respiration of field grown plants. Moreover, Specific Leaf Area (SLA) measures leaf area per dry weight which is used to determine resource allocation vis-a-viz respiratory substrates (Reich et al., 1998; Xu et al., 2015). A lower SLA has been interpreted to mean greater allocation of biomass to structural rather than to metabolic components of the leaf (Reich et al., 1998).

The current research presented here focused on dark respiration in relation to SLA, elevated CO$_2$ and temperature in a wild type soybean plant and transgenic species which have been modified to express SBP. The objective was to study the effects of elevated CO$_2$ of approximately 585 μmol mol$^{-1}$ and +3.5 increase in temperature on wild type and transgenic SBP plants. These plants were grown in the field at ambient and elevated CO$_2$ and respiration measured at night (nocturnal respiration). Responses were examined in some experiments in combination with continuous heating, in order to provide a clearer view of the physiological impacts of elevated temperature, which is projected to occur with global change.

**MATERIALS AND METHODS**

**Description of the plant varieties, field site, heating equipment and sample collection**

Wild type (Thorne variety) and SBP soybean (Glycine max) plants were grown in the field at SoyFACE, Savoy, IL, USA (Ruiz-Vera et
al., 2013). They were grown during 2015 summer growing season at different plots separated into: 1) control (ambient CO₂ that is approximately 400 μmol mol⁻¹ CO₂ and ambient temperature that is day time temperature); 2) elevated temperature (eT) that is ambient CO₂ and +3.5°C in temperature; 3) elevated CO₂ (eC) that is approximately 585 μmol mol⁻¹ CO₂ and ambient temperature), and 4) combined elevated temperature and elevated CO₂ (eT + eC) that is approximately 585 μmol mol⁻¹ CO₂ and +3.5°C in temperature).

Each experiment consists of a randomized complete block design. Heaters were turned on at the beginning of the growing season for eT and eT+eC treatments. Continuous heating was imposed using infrared (IR) heating technology. Each heated plots contained six infrared heaters mounted 1.2 m above canopy level and positioned 45° angle towards the plot. Heater outputs were regulated using a custom built industrial dimmer system and controlled using a data logger (CR1000 Micro logger, Campbell Scientific) to maintain a 3.5°C temperature increase, relative to ambient temperature for 24 h throughout the growing season. Full description of the infrared heaters, dimmers and radiometers is given in Ruiz-Vera et al. (2013). Elevated temperature and CO₂ were maintained from sunrise to sunset and applied from emergence to the time plants were harvested. On sample collection days, between DOY 188 to 238, youngest fully expanded soybean leaves were excised for 1 h into sunset with a blade, transferred into Eppendorf tubes filled with distilled water and sealed with parafilm. Measurements were made between 10 pm and 4 am.

Description of experiments

Experiment 1

To investigate the effects of CO₂ on Rn at different growth stages, leaves were collected at 33 days (DOY-188), 41 days (DOY-196), 61 days (DOY-216) and 83 days (DOY-238) after planting. At the time of collection, plants were at V4, V5, R1 and R6 stages of development.

Before starting the experiment, Rn was examined preliminarily on intact and detached leaves in the field and growth chamber. It was observed that Rn values were unaffected for several hours. However, values were different during the daytime on darkened leaves. Thus, measurements for this experiment were made between 10 pm and 4 am. Leaves collected in the field were kept in a dark box. The leaves were subsequently moved to a growth chamber (Environmental Growth Chambers, Chagrin Falls, Ohio, USA) in the laboratory. The growth chamber was darkened and programmed to match the minimum daytime conditions of temperature and humidity. Temperature was also adjusted according to the experimental plan. Leaf punches (12 mm) were collected at each CO₂ and temperature growing condition for the calculation of SLA. For this, leaves were oven-dried to a constant weight at 70°C and SLA calculated as leaf area, divided by dry weight. Respiration rates measured as net CO₂ efflux in the dark were determined by placing the leaves in a 6x2 Licor 6400 (Nebraska, USA) black-tape covered cuvette. Leaves were positioned in such a way that the cuvette was completely filled. To investigate acclimation of respiration to elevated CO₂, leaves collected from ambient temperature that is day time temperature and ambient CO₂ grown plants, grown in approximately 400 μmol mol⁻¹ CO₂ plot were measured at ambient and elevated CO₂ under ambient temperature (set using the growth chamber). Leaves collected from elevated CO₂ that is approximately 585 μmol mol⁻¹ CO₂ and ambient temperature grown plants were measured at elevated and ambient CO₂ under ambient temperature (set using the growth chamber).

Leaves collected from elevated CO₂ and elevated temperature that is +3.5°C in temperature grown plants were measured at ambient and elevated CO₂ conditions under elevated temperature (set using the growth chamber). A flow rate of 300 mmol s⁻¹ in the Licor 6400 chamber was used for this experiment. After allowing the Licor machine to stabilize for approximately 5 min, four biological replicates were measured for each treatment.

To investigate thermal acclimation to temperature, nocturnal temperature response curves (from 15 to 40°C; heating rate of 1°C min⁻¹) were measured using Licor 6400 on leaves from plants grown at 1) ambient temperature that is day time temperature and ambient CO₂ which is approximately 400 μmol mol⁻¹ CO₂, 2) elevated temperature that is +3.5°C in temperature, and 3) combined elevated temperature and elevated CO₂ that is +3.5°C in temperature and approximately 585 μmol mol⁻¹ CO₂. Leaves collected from ambient CO₂ plots (at control or elevated temperature) were measured at ambient CO₂, whereas those collected from elevated CO₂ plots (control or elevated temperature) were measured at elevated CO₂. After allowing the Licor machine to stabilize for approximately 5 min, three biological replicates were measured for each treatment.

Statistical analysis

Data were analyzed using a mixed - model ANOVA obtained with Kenward-Roger method in SAS System 9.3 (SAS institute). Student t tests were used to compare treatments and means taking into consideration the differences of least square means. Statistical significance was estimated at P ≤ 0.05. Comprehensive details of the statistical analysis can be found in Supplementary Table 1.
RESULTS AND DISCUSSION

To determine if different growth conditions - eT, eC and eT+eC lead to greater allocation of biomass rather than metabolism (Reich et al., 1998) in soybean grown in the field, specific leaf area (SLA, leaf area per unit dry matter) was measured. The control and eT grown plants had similar SLA in the four developmental stages measured for wild type and SBP varieties. For the SBP variety, SLA for the three treatments was higher on V4, V5 and R1 but dropped significantly on R6 (P<0.05) (Figure 1). For wild type, the drop on R6 for the three treatments was significant relative to the treatments on V5. The drop in SLA at R6 could represent a preferential allocation of biomass over metabolism in both varieties (Reich et al., 1998). SLA in eC and eT+eC grown plants was lower, relative to those grown in control and eT for the wild type and SBP varieties at V4. SLA for the treatments at V5 matched the previous V4 data in the wildtype variety. However, for eC grown plants, SLA values were similar at R1 in the wild type and transgenic SBP varieties. SLA measures the leaf area per dry weight of leaf tissues at a particular time. The relationship between SLA and dark respiration showed differential responses at growth and measurement temperatures in both varieties (Figure 2). Thus, suggesting that overall, there was a balance between biomass allocation and metabolism (respiratory substrates) in the plants.

To determine if SLA correlated with dark respiration (Rn) at various developmental stages at growth and measurement temperatures, plants were examined at V4, V5, R1 and R6 developmental stages. There were differential effects of Rn at the various growth and measurement stages in both varieties. Dark respiration (Rd) did not differ significantly in the wild type plants at growth and measurement temperatures on V4. In contrast, in SBP plants, Rd was lower for all the conditions at same measurement temperature on V4 and V5 relative to control (P<0.05) (Figure 3). Rn in SBP plants grown and measured at eC and eT+eC, did not decrease significantly relative to control at R1 and R6, respectively (Figure 3). For both varieties, Rd was overall lowest and differed markedly from control in eT and eT+eC grown plants from V5 to R6 in both growth and measurement temperatures (Figure 3). A number of studies have shown that elevated CO₂ stimulates Rd (Leakey et al., 2009a; Leakey et al., 2009b). Other studies showed approximately 14 to 18% reduction when plants were grown in elevated CO₂ relative to ambient CO₂ (Drake et al., 1999; Hamilton et al., 2003). It was hypothesized in this study that growth in elevated temperature will improve respiration in both varieties. Contrary to this hypothesis, this did not occur instead there was overall loss of Rn in both varieties from V5 to R6 (Figure 3). This is consistent with the idea that Rn decrease is general and low stimulation of respiratory substrates occurred under the measured conditions in both the wild type and SBPase plants (Reich et al., 1998; Xu et al., 2015; Ziska and Bunce, 1998). It should also be noted that the CO₂ effects can be artifacts and the lack of biochemical data particularly carbohydrates data limits the interpretation of the data.

Figure 1. Specific leaf area of wild type (A) and transgenic SBP (B) soybean plants grown at control, elevated CO₂, elevated temperature (eT) and a combination of elevated temperature and CO₂ (eT+eC).
Plants grown at eT and eT+eC consistently had the lowest Rn values as shown in Figure 3. To understand if the low values were due to thermal acclimation, a temperature response experiment was performed when plants were at V4 and R6 stages of development. eT grown plants had a lower Rd with increasing temperature in the two varieties at V4. Compared with eT grown plants, Rn tended to increase when plants were grown at eT+eC at V4 in wild type but not markedly in the transgenic SBP (Figure 4). At R6, a similar response was observed in the wild type where growth in eT+eC resulted in an increase in Rn with increasing temperature. However, there was a less marked decrease when plants were grown at eT for SBP (Figure 4). Thus, the temperature response of dark respiration in the wild type and transgenic SBP plants suggests that there was acclimation to eT at V4 and R6 growth stages in both plants but less so in the transgenic SBP at R6 (Figure 4). With acclimation, low Rn in response to eT might not necessarily indicate more carbon loss as foliar respiration has been reported to contrast with whole plant total nonstructural carbohydrates in response to eT (Zha et al., 2001; Duan et al., 2013). There is also no evidence that respiration directly correlates with substrate availability after long-term exposure to a particular temperature (Bunce, 2007).

Conclusion

Elevated CO₂ did not stimulate nocturnal dark respiration in the wild type and transgenic SBP soybean plants studied. This suggests that unlike photorespiration, an increase in carbon dioxide may not always induce higher dark respiration in the field. Elevated temperature did not also induce higher dark respiration in both varieties. Instead, a lower dark respiration was generally observed at growth temperature with increasing temperature and this was attributed to temperature acclimation.

Conflict of interest

The author has not declared any conflict of interests.

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Figure 3. Nocturnal dark respiration (Rn) of wild type and transgenic SBP soybean plants measured at growth and measurement temperatures at control, elevated CO₂ (eC), elevated temperature (eT) and a combination of elevated temperature and CO₂ (eT+eC). 

mT= measurement temperature.
Figure 4. Nocturnal dark respiration (Rn) temperature response curves of wild type and transgenic SBP soybean plants measured at same temperature at control, elevated CO₂, elevated temperature (eT) and a combination of elevated temperature and CO₂ (eT+eC).

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Supplementary Table 1. Differences of Least Squares Means.

| Effect         | Trt    | Var | DOY  | _Trt_ | Var | DOY  | Estimate | Standard Error | DF | t Value | Pr > |t| |
|----------------|--------|-----|------|-------|-----|------|----------|----------------|----|---------|------|---|---|
| DOY*Trt*Var    | control| SBP | 188  | control | wt | 188  | 0.5088  | 0.2403         | 224| 2.12    | 0.0353|
| DOY*Trt*Var    | control| SBP | 188  | eC    | SBP | 188  | 0.475   | 0.2403         | 224| 1.98    | 0.0493|
| DOY*Trt*Var    | control| SBP | 188  | eC    | wt  | 188  | 0.4675  | 0.2403         | 224| 1.95    | 0.0529|
| DOY*Trt*Var    | control| SBP | 188  | eT    | SBP | 188  | 0.5475  | 0.2403         | 224| 2.28    | 0.0236|
| DOY*Trt*Var    | control| SBP | 188  | eT    | wt  | 188  | 0.6     | 0.2403         | 224| 2.5     | 0.0132|
| DOY*Trt*Var    | control| SBP | 188  | eT*eC | SBP | 188  | 0.4875  | 0.2403         | 224| 2.03    | 0.0436|
| DOY*Trt*Var    | control| SBP | 188  | eT*eC | wt  | 188  | 0.5463  | 0.2403         | 224| 2.27    | 0.0239|
| DOY*Trt*Var    | control| SBP | 188  | control | SBP | 196  | -0.1587 | 0.2403        | 224| -0.66   | 0.5095|
| DOY*Trt*Var    | control| SBP | 188  | eC    | SBP | 196  | 0.535   | 0.2403         | 224| 2.23    | 0.027 |
| DOY*Trt*Var    | control| SBP | 188  | eC    | wt  | 196  | 0.7     | 0.2403         | 224| 2.91    | 0.0039|
| DOY*Trt*Var    | control| SBP | 188  | eT    | SBP | 196  | 0.4613  | 0.2403         | 224| 1.92    | 0.0562|
| DOY*Trt*Var    | control| SBP | 188  | eT    | wt  | 196  | 0.7838  | 0.2403         | 224| 3.26    | 0.0013|
| DOY*Trt*Var    | control| SBP | 188  | eT*eC | SBP | 196  | 0.8712  | 0.2403         | 224| 3.63    | 0.0004|
| DOY*Trt*Var    | control| SBP | 188  | eT*eC | wt  | 196  | 0.7775  | 0.2403         | 224| 3.24    | 0.0014|
| DOY*Trt*Var    | control| SBP | 188  | control | SBP | 216  | 0.18    | 0.2403         | 224| 0.75    | 0.4545|
| DOY*Trt*Var    | control| SBP | 188  | control | wt | 216  | 0.0425  | 0.2403         | 224| 0.18    | 0.8598|
| DOY*Trt*Var    | control| SBP | 188  | eC    | SBP | 216  | -0.1537 | 0.2403        | 224| -0.64   | 0.5229|
| DOY*Trt*Var    | control| SBP | 188  | eC    | wt  | 216  | -0.0913 | 0.2403        | 224| -0.38   | 0.7045|
| DOY*Trt*Var    | control| SBP | 188  | eT    | SBP | 216  | 0.6088  | 0.2403         | 224| 2.53    | 0.012 |
| DOY*Trt*Var    | control| SBP | 188  | eT    | wt  | 216  | 0.665   | 0.2403         | 224| 2.77    | 0.0061|
| DOY*Trt*Var    | control| SBP | 188  | eT*eC | SBP | 216  | 0.5437  | 0.2403         | 224| 2.26    | 0.0246|
| DOY*Trt*Var    | control| SBP | 188  | eT*eC | wt  | 216  | 0.7938  | 0.2403         | 224| 3.3     | 0.0011|
| DOY*Trt*Var    | control| SBP | 188  | control | SBP | 238  | 0.00875 | 0.2403        | 224| 0.04    | 0.971 |
| DOY*Trt*Var    | control| SBP | 188  | control | wt | 238  | -0.0463 | 0.2403        | 224| -0.19   | 0.8475|
| DOY*Trt*Var    | control| SBP | 188  | eC    | SBP | 238  | 0.2875  | 0.2403         | 224| 1.2     | 0.2327|
| DOY*Trt*Var    | control| SBP | 188  | eC    | wt  | 238  | 0.3875  | 0.2403         | 224| 1.61    | 0.1082|
| DOY*Trt*Var    | control| SBP | 188  | eT    | SBP | 238  | 0.8736  | 0.2403         | 224| 3.64    | 0.0003|
| DOY*Trt*Var    | control| SBP | 188  | eT    | wt  | 238  | 0.8113  | 0.2403         | 224| 3.38    | 0.0009|
| DOY*Trt*Var    | control| SBP | 188  | eT*eC | SBP | 238  | 0.4825  | 0.2403         | 224| 2.01    | 0.0458|
| DOY*Trt*Var    | control| SBP | 188  | eT*eC | wt  | 238  | 0.5337  | 0.2403         | 224| 2.22    | 0.0273|
| DOY*Trt*Var    | control| wt  | 188  | eC    | SBP | 188  | -0.0338 | 0.2403        | 224| -0.14   | 0.8884|
| DOY*Trt*Var    | control| wt  | 188  | eC    | wt  | 188  | -0.0413 | 0.2403        | 224| -0.17   | 0.8638|
| DOY*Trt*Var    | control| wt  | 188  | eT    | SBP | 188  | 0.03875 | 0.2403        | 224| 0.16    | 0.872 |
| DOY*Trt*Var    | control| wt  | 188  | eT    | wt  | 188  | 0.09125 | 0.2403        | 224| 0.38    | 0.7045|
| DOY*Trt*Var    | control| wt  | 188  | eT*eC | SBP | 188  | -0.0213 | 0.2403        | 224| -0.09   | 0.9296|
**Supplementary Table 1. Contd.**

| DOY*Trt*Var | control | wt 188 eT+eC wt 188 | 0.0375 | 0.2403 | 224 | 0.16 | 0.8761 |
|------------|---------|---------------------|--------|--------|-----|------|-------|
| DOY*Trt*Var | control | wt 188 control SBP 196 | -0.6675 | 0.2403 | 224 | -2.78 | 0.0059 |
| DOY*Trt*Var | control | wt 188 control wt 196 | -0.6625 | 0.2403 | 224 | -2.76 | 0.0063 |
| DOY*Trt*Var | control | wt 188 eC SBP 196 | 0.02625 | 0.2403 | 224 | 0.11 | 0.9131 |
| DOY*Trt*Var | control | wt 188 eC wt 196 | 0.1913 | 0.2403 | 224 | 0.8 | 0.4269 |
| DOY*Trt*Var | control | wt 188 eT SBP 196 | -0.0475 | 0.2403 | 224 | -0.2 | 0.8435 |
| DOY*Trt*Var | control | wt 188 eT wt 196 | 0.275 | 0.2403 | 224 | 1.14 | 0.2536 |
| DOY*Trt*Var | control | wt 188 eT+eC SBP 196 | 0.3625 | 0.2403 | 224 | 1.51 | 0.1328 |
| DOY*Trt*Var | control | wt 188 eT+eC wt 196 | 0.2688 | 0.2403 | 224 | 1.12 | 0.2645 |
| DOY*Trt*Var | control | wt 188 control SBP 216 | -0.3288 | 0.2403 | 224 | -1.37 | 0.1726 |
| DOY*Trt*Var | control | wt 188 control wt 216 | -0.4662 | 0.2403 | 224 | -1.94 | 0.0536 |
| DOY*Trt*Var | control | wt 188 eC SBP 216 | -0.6625 | 0.2403 | 224 | -2.76 | 0.0063 |
| DOY*Trt*Var | control | wt 188 eC wt 216 | -0.6 | 0.2403 | 224 | -2.5 | 0.0132 |
| DOY*Trt*Var | control | wt 188 eT SBP 216 | 0.1 | 0.2403 | 224 | 0.42 | 0.6777 |
| DOY*Trt*Var | control | wt 188 eT wt 216 | 0.1563 | 0.2403 | 224 | 0.65 | 0.5162 |
| DOY*Trt*Var | control | wt 188 eT+eC SBP 216 | 0.035 | 0.2403 | 224 | 0.15 | 0.8843 |
| DOY*Trt*Var | control | wt 188 eT+eC wt 216 | 0.285 | 0.2403 | 224 | 1.19 | 0.2368 |
| DOY*Trt*Var | control | wt 188 control SBP 238 | -0.5 | 0.2403 | 224 | -2.08 | 0.0386 |
| DOY*Trt*Var | control | wt 188 control wt 238 | -0.555 | 0.2403 | 224 | -2.31 | 0.0218 |
| DOY*Trt*Var | control | wt 188 eC SBP 238 | -0.2213 | 0.2403 | 224 | -0.92 | 0.3581 |
| DOY*Trt*Var | control | wt 188 eC wt 238 | -0.1212 | 0.2403 | 224 | -0.5 | 0.6143 |
| DOY*Trt*Var | control | wt 188 eT SBP 238 | 0.3649 | 0.2403 | 224 | 1.52 | 0.1303 |
| DOY*Trt*Var | control | wt 188 eT wt 238 | 0.3025 | 0.2403 | 224 | 1.26 | 0.2093 |
| DOY*Trt*Var | control | wt 188 eT+eC SBP 238 | -0.0263 | 0.2403 | 224 | -0.11 | 0.9131 |
| DOY*Trt*Var | control | wt 188 eT+eC wt 238 | 0.025 | 0.2403 | 224 | 0.1 | 0.9172 |
| DOY*Trt*Var | eC SBP 188 eC wt 188 | -0.0075 | 0.2403 | 224 | -0.03 | 0.9751 |
| DOY*Trt*Var | eC SBP 188 eT SBP 188 | 0.0725 | 0.2403 | 224 | 0.3 | 0.7631 |
| DOY*Trt*Var | eC SBP 188 eT wt 188 | 0.125 | 0.2403 | 224 | 0.52 | 0.6034 |
| DOY*Trt*Var | eC SBP 188 eT+eC SBP 188 | 0.0125 | 0.2403 | 224 | 0.05 | 0.9586 |
| DOY*Trt*Var | eC SBP 188 eT+eC wt 188 | 0.07125 | 0.2403 | 224 | 0.3 | 0.7671 |
| DOY*Trt*Var | eC SBP 188 control SBP 196 | -0.6338 | 0.2403 | 224 | -2.64 | 0.0089 |
| DOY*Trt*Var | eC SBP 188 control wt 196 | -0.6287 | 0.2403 | 224 | -2.62 | 0.0095 |
| DOY*Trt*Var | eC SBP 188 eC SBP 196 | 0.06 | 0.2403 | 224 | 0.25 | 0.803 |
| DOY*Trt*Var | eC SBP 188 eC wt 196 | 0.225 | 0.2403 | 224 | 0.94 | 0.35 |
| DOY*Trt*Var | eC SBP 188 eT SBP 196 | -0.0138 | 0.2403 | 224 | -0.06 | 0.9544 |
| DOY*Trt*Var | eC SBP 188 eT wt 196 | 0.3088 | 0.2403 | 224 | 1.29 | 0.2001 |
| DOY*Trt*Var | eC SBP 188 eT+eC SBP 196 | 0.3962 | 0.2403 | 224 | 1.65 | 0.1005 |
**Supplementary Table 1. Contd.**

| DOY*Trt*Var | eC   | SBP  | 188 | eT+eC | wt  | 196 | 0.3025 | 0.2403 | 224 | 1.26 | 0.2093 |
|-------------|------|------|-----|-------|-----|-----|--------|--------|-----|-----|--------|
| DOY*Trt*Var | eC   | SBP  | 188 | control | SBP | 216 | -0.295 | 0.2403 | 224 | -1.23 | 0.2208 |
| DOY*Trt*Var | eC   | SBP  | 188 | control | wt  | 216 | -0.4325 | 0.2403 | 224 | -1.8  | 0.0732 |
| DOY*Trt*Var | eC   | SBP  | 188 | eC   | SBP | 216 | -0.6287 | 0.2403 | 224 | -2.62 | 0.0095 |
| DOY*Trt*Var | eC   | SBP  | 188 | eC   | wt  | 216 | -0.5667 | 0.2403 | 224 | -2.36 | 0.0193 |
| DOY*Trt*Var | eC   | SBP  | 188 | eT   | SBP | 216 | 0.1338  | 0.2403 | 224 | 0.56  | 0.5783 |
| DOY*Trt*Var | eC   | SBP  | 188 | eC   | wt  | 216 | 0.19    | 0.2403 | 224 | 0.79  | 0.4299 |
| DOY*Trt*Var | eC   | SBP  | 188 | eT+eC | SBP | 216 | 0.06875 | 0.2403 | 224 | 0.29  | 0.775 |
| DOY*Trt*Var | eC   | SBP  | 188 | eT+eC | wt  | 216 | 0.3188  | 0.2403 | 224 | 1.33  | 0.186 |
| DOY*Trt*Var | eC   | SBP  | 188 | control | SBP | 238 | -0.4663 | 0.2403 | 224 | -1.94 | 0.0536 |
| DOY*Trt*Var | eC   | SBP  | 188 | control | wt  | 238 | -0.5212 | 0.2403 | 224 | -2.17 | 0.0311 |
| DOY*Trt*Var | eC   | SBP  | 188 | eC   | SBP | 238 | -0.1875 | 0.2403 | 224 | -0.78 | 0.436 |
| DOY*Trt*Var | eC   | SBP  | 188 | eC   | wt  | 238 | -0.0875 | 0.2403 | 224 | -0.36 | 0.7161 |
| DOY*Trt*Var | eC   | SBP  | 188 | eT   | SBP | 238 | 0.3986  | 0.2403 | 224 | 1.66  | 0.0985 |
| DOY*Trt*Var | eC   | SBP  | 188 | eT   | wt  | 238 | 0.3363  | 0.2403 | 224 | 1.4   | 0.163 |
| DOY*Trt*Var | eC   | SBP  | 188 | eT+eC | SBP | 238 | 0.0075  | 0.2403 | 224 | 0.03  | 0.9751 |
| DOY*Trt*Var | eC   | SBP  | 188 | eT+eC | wt  | 238 | 0.05875 | 0.2403 | 224 | 0.24  | 0.8071 |
| DOY*Trt*Var | eC   | wt   | 188 | eT   | SBP | 188 | 0.08    | 0.2403 | 224 | 0.33  | 0.7395 |
| DOY*Trt*Var | eC   | wt   | 188 | eT   | wt  | 188 | 0.1325  | 0.2403 | 224 | 0.55  | 0.5819 |
| DOY*Trt*Var | eC   | wt   | 188 | eT+eC | SBP | 188 | 0.02    | 0.2403 | 224 | 0.08  | 0.9337 |
| DOY*Trt*Var | eC   | wt   | 188 | eT+eC | wt  | 188 | 0.0785  | 0.2403 | 224 | 0.33  | 0.7434 |
| DOY*Trt*Var | eC   | wt   | 188 | control | SBP | 196 | -0.6263 | 0.2403 | 224 | -2.61 | 0.0098 |
| DOY*Trt*Var | eC   | wt   | 188 | control | wt  | 196 | -0.6212 | 0.2403 | 224 | -2.59 | 0.0104 |
| DOY*Trt*Var | eC   | wt   | 188 | eC   | SBP | 196 | 0.0675  | 0.2403 | 224 | 0.28  | 0.779 |
| DOY*Trt*Var | eC   | wt   | 188 | eC   | wt  | 196 | 0.2325  | 0.2403 | 224 | 0.97  | 0.3342 |
| DOY*Trt*Var | eC   | wt   | 188 | eT   | SBP | 196 | -0.0063 | 0.2403 | 224 | -0.03 | 0.9793 |
| DOY*Trt*Var | eC   | wt   | 188 | eT   | wt  | 196 | 0.3163  | 0.2403 | 224 | 1.32  | 0.1894 |
| DOY*Trt*Var | eC   | wt   | 188 | eT+eC | SBP | 196 | 0.4037  | 0.2403 | 224 | 1.68  | 0.0943 |
| DOY*Trt*Var | eC   | wt   | 188 | eT+eC | wt  | 196 | 0.31    | 0.2403 | 224 | 1.29  | 0.1983 |
| DOY*Trt*Var | eC   | wt   | 188 | control | SBP | 216 | -0.2875 | 0.2403 | 224 | -1.2  | 0.2327 |
| DOY*Trt*Var | eC   | wt   | 188 | control | wt  | 216 | -0.425  | 0.2403 | 224 | -1.77 | 0.0783 |
| DOY*Trt*Var | eC   | wt   | 188 | eC   | SBP | 216 | -0.6213 | 0.2403 | 224 | -2.59 | 0.0104 |
| DOY*Trt*Var | eC   | wt   | 188 | eC   | wt  | 216 | -0.5588 | 0.2403 | 224 | -2.33 | 0.0209 |
| DOY*Trt*Var | eC   | wt   | 188 | eT   | SBP | 216 | 0.1413  | 0.2403 | 224 | 0.59  | 0.5572 |
| DOY*Trt*Var | eC   | wt   | 188 | eT   | wt  | 216 | 0.1975  | 0.2403 | 224 | 0.82  | 0.4119 |
| DOY*Trt*Var | eC   | wt   | 188 | eT+eC | SBP | 216 | 0.07625 | 0.2403 | 224 | 0.32  | 0.7513 |
| DOY*Trt*Var | eC   | wt   | 188 | eT+eC | wt  | 216 | 0.3263  | 0.2403 | 224 | 1.36  | 0.1759 |
**Supplementary Table 1.** Contd.

| DOY*Trt*Var | Substrate | y | 188 | Control | Trt | 238 | -0.4588 | 0.2403 | 224 | -1.91 | 0.0575 | 0.0336 | 0.4545 | 0.7395 | 0.0924 | 0.1539 | 0.9503 | 0.783 | 0.8272 | 0.803 | 0.9959 | 0.0036 | 0.0393 | 0.5263 | 0.72 | 0.3265 | 0.1792 | 0.3395 | 0.0387 | 0.0039 | 0.0084 | 0.799 | 0.6253 | 0.9876 | 0.3065 | 0.0259 | 0.0142 | 0.2804 | 0.5061 | 0.176 | 0.2735 | 0.787 | 0.9544 | 0.8401 | 0.8232 |
### Supplementary Table 1. Contd.

| DOY*Trt*Var | Var | wt | 188 | control | SBP | 196 | -0.7588 | 0.2403 | 224 | -3.16 | 0.0018 |
|-------------|-----|----|-----|---------|-----|-----|--------|-------|-----|-------|--------|
| DOY*Trt*Var | eT  | wt | 188 | control | wt | 196 | -0.7538 | 0.2403 | 224 | -3.14 | 0.0019 |
| DOY*Trt*Var | eT  | wt | 188 | eC    | SBP | 196 | -0.065  | 0.2403 | 224 | -0.27 | 0.787  |
| DOY*Trt*Var | eT  | wt | 188 | eC    | wt | 196 | 0.1     | 0.2403 | 224 | 0.42  | 0.6777 |
| DOY*Trt*Var | eT  | wt | 188 | eT    | SBP | 196 | -0.1387 | 0.2403 | 224 | -0.58 | 0.5642 |
| DOY*Trt*Var | eT  | wt | 188 | eT    | wt | 196 | 0.1838  | 0.2403 | 224 | 0.76  | 0.4452 |
| DOY*Trt*Var | eT  | wt | 188 | eT+C  | SBP | 196 | 0.2712  | 0.2403 | 224 | 1.13  | 0.2601 |
| DOY*Trt*Var | eT  | wt | 188 | eT+C  | wt | 196 | 0.1775  | 0.2403 | 224 | 0.74  | 0.4608 |
| DOY*Trt*Var | eT  | wt | 188 | control | SBP | 216 | -0.42   | 0.2403 | 224 | -1.75 | 0.0818 |
| DOY*Trt*Var | eT  | wt | 188 | control | wt | 216 | -0.5575 | 0.2403 | 224 | -2.32 | 0.0212 |
| DOY*Trt*Var | eT  | wt | 188 | eC    | SBP | 216 | -0.7538 | 0.2403 | 224 | -3.14 | 0.0019 |
| DOY*Trt*Var | eT  | wt | 188 | eC    | wt | 216 | -0.6913 | 0.2403 | 224 | -2.88 | 0.0044 |
| DOY*Trt*Var | eT  | wt | 188 | eT    | SBP | 216 | 0.00875 | 0.2403 | 224 | 0.04  | 0.971  |
| DOY*Trt*Var | eT  | wt | 188 | eT    | wt | 216 | 0.065   | 0.2403 | 224 | 0.27  | 0.787  |
| DOY*Trt*Var | eT  | wt | 188 | eT+C  | SBP | 216 | -0.0563 | 0.2403 | 224 | -0.23 | 0.8151 |
| DOY*Trt*Var | eT  | wt | 188 | eT+C  | wt | 216 | 0.1938  | 0.2403 | 224 | 0.81  | 0.4209 |
| DOY*Trt*Var | eT  | wt | 188 | control | SBP | 238 | -0.5913 | 0.2403 | 224 | -2.46 | 0.0146 |
| DOY*Trt*Var | eT  | wt | 188 | control | wt | 238 | -0.6462 | 0.2403 | 224 | -2.69 | 0.0077 |
| DOY*Trt*Var | eT  | wt | 188 | eC    | SBP | 238 | -0.3125 | 0.2403 | 224 | -1.3  | 0.1947 |
| DOY*Trt*Var | eT  | wt | 188 | eC    | wt | 238 | -0.2125 | 0.2403 | 224 | -0.88 | 0.3774 |
| DOY*Trt*Var | eT  | wt | 188 | eT    | SBP | 238 | 0.2736  | 0.2403 | 224 | 1.14  | 0.256  |
| DOY*Trt*Var | eT  | wt | 188 | eT    | wt | 238 | 0.2113  | 0.2403 | 224 | 0.88  | 0.3802 |
| DOY*Trt*Var | eT  | wt | 188 | eT+C  | SBP | 238 | -0.1175 | 0.2403 | 224 | -0.49 | 0.6253 |
| DOY*Trt*Var | eT  | wt | 188 | eT+C  | wt | 238 | -0.0663 | 0.2403 | 224 | -0.28 | 0.783  |
| DOY*Trt*Var | eT+C | SBP | 188 | eT+C  | wt | 188 | 0.05875 | 0.2403 | 224 | 0.24  | 0.8071 |
| DOY*Trt*Var | eT+C | SBP | 188 | control | SBP | 196 | -0.6462 | 0.2403 | 224 | -2.69 | 0.0077 |
| DOY*Trt*Var | eT+C | SBP | 188 | control | wt | 196 | -0.6412 | 0.2403 | 224 | -2.67 | 0.0082 |
| DOY*Trt*Var | eT+C | SBP | 188 | eC    | SBP | 196 | 0.0475  | 0.2403 | 224 | 0.2   | 0.8435 |
| DOY*Trt*Var | eT+C | SBP | 188 | eC    | wt | 196 | 0.2125  | 0.2403 | 224 | 0.88  | 0.3774 |
| DOY*Trt*Var | eT+C | SBP | 188 | eT    | SBP | 196 | -0.0263 | 0.2403 | 224 | -0.11 | 0.9131 |
| DOY*Trt*Var | eT+C | SBP | 188 | eT    | wt | 196 | 0.2963  | 0.2403 | 224 | 1.23  | 0.2189 |
| DOY*Trt*Var | eT+C | SBP | 188 | eT+C  | SBP | 196 | 0.3838  | 0.2403 | 224 | 1.6   | 0.1116 |
| DOY*Trt*Var | eT+C | SBP | 188 | eT+C  | wt | 196 | 0.29    | 0.2403 | 224 | 1.21  | 0.2287 |
| DOY*Trt*Var | eT+C | SBP | 188 | control | SBP | 216 | -0.3075 | 0.2403 | 224 | -1.28 | 0.2019 |
| DOY*Trt*Var | eT+C | SBP | 188 | control | wt | 216 | -0.445  | 0.2403 | 224 | -1.85 | 0.0653 |
| DOY*Trt*Var | eT+C | SBP | 188 | eC    | SBP | 216 | -0.6412 | 0.2403 | 224 | -2.67 | 0.0082 |
| DOY*Trt*Var | eT+C | SBP | 188 | eC    | wt | 216 | -0.5787 | 0.2403 | 224 | -2.41 | 0.0168 |
**Supplementary Table 1.** Contd.

| DOY*Trt*Var  | eT+eC | SBP  | 188 eT | SBP  | 216 | 0.1213 | 0.2403 | 224 | 0.5 | 0.6143 |
|-------------|-------|------|--------|------|-----|--------|--------|-----|-----|--------|
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT | wt   | 216 | 0.1775 | 0.2403 | 224 | 0.74 | 0.4608 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT+eC | SBP  | 216 | 0.05625 | 0.2403 | 224 | 0.23 | 0.8151 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT+eC | wt   | 216 | 0.3063 | 0.2403 | 224 | 1.27 | 0.2038 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 control | SBP  | 238 | -0.4788 | 0.2403 | 224 | -1.99 | 0.0475 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 control | wt   | 238 | -0.5337 | 0.2403 | 224 | -2.22 | 0.0273 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eC  | SBP  | 238 | -0.2   | 0.2403 | 224 | -0.83 | 0.4061 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eC  | wt   | 238 | -0.1   | 0.2403 | 224 | -0.42 | 0.6777 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT  | SBP  | 238 | 0.3861 | 0.2403 | 224 | 1.61 | 0.1094 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT  | wt   | 238 | 0.3238 | 0.2403 | 224 | 1.35 | 0.1792 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT+eC | SBP  | 238 | -0.005 | 0.2403 | 224 | -0.02 | 0.9834 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT+eC | wt   | 238 | 0.04625 | 0.2403 | 224 | 0.19 | 0.8475 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eC  | SBP  | 196 | -0.705 | 0.2403 | 224 | -2.93 | 0.0037 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eC  | wt   | 238 | -0.113 | 0.2403 | 224 | -0.05 | 0.9627 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eC  | wt   | 238 | 0.1537 | 0.2403 | 224 | 0.64 | 0.5229 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT  | SBP  | 196 | -0.085 | 0.2403 | 224 | -0.35 | 0.7238 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT  | wt   | 238 | 0.2375 | 0.2403 | 224 | 0.99 | 0.324 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT+eC | SBP  | 196 | 0.325  | 0.2403 | 224 | 1.35 | 0.1775 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT+eC | wt   | 196 | 0.2312 | 0.2403 | 224 | 0.96 | 0.3368 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 control | SBP  | 216 | -0.3663 | 0.2403 | 224 | -1.52 | 0.1288 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 control | wt   | 216 | -0.5038 | 0.2403 | 224 | -2.1  | 0.0371 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eC  | SBP  | 216 | -0.7   | 0.2403 | 224 | -2.91 | 0.0039 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eC  | wt   | 216 | -0.6375 | 0.2403 | 224 | -2.65 | 0.0085 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT  | SBP  | 216 | 0.0625 | 0.2403 | 224 | 0.26 | 0.795 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT  | wt   | 216 | 0.1187 | 0.2403 | 224 | 0.49 | 0.6216 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT+eC | SBP  | 216 | -0.0025 | 0.2403 | 224 | -0.01 | 0.9917 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT+eC | wt   | 216 | 0.2475 | 0.2403 | 224 | 1.03 | 0.3041 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 control | SBP  | 238 | -0.5375 | 0.2403 | 224 | -2.24 | 0.0263 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 control | wt   | 238 | -0.5925 | 0.2403 | 224 | -2.47 | 0.0144 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eC  | SBP  | 238 | -0.2588 | 0.2403 | 224 | -1.08 | 0.2827 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eC  | wt   | 238 | -0.1587 | 0.2403 | 224 | -0.66 | 0.5095 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT  | SBP  | 238 | 0.3274 | 0.2403 | 224 | 1.36 | 0.1744 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT  | wt   | 238 | 0.265  | 0.2403 | 224 | 1.1  | 0.2712 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT+eC | SBP  | 238 | -0.0638 | 0.2403 | 224 | -0.27 | 0.791 |
| DOY*Trt*Var  | eT+eC | SBP  | 188 eT+eC | wt   | 238 | -0.0125 | 0.2403 | 224 | -0.05 | 0.9586 |
### Supplementary Table 1. Contd.

| DOY*Trt*Var       | control | SBP 196 | control | wt 196 | 0.005 | 0.2403 | 224 | 0.02  | 0.9834 |
|-------------------|---------|---------|---------|--------|-------|--------|-----|-------|--------|
| DOY*Trt*Var       | control | SBP 196 | eC SBP 196 | 0.6938 | 0.2403 | 224 | 2.89  | 0.0043 |
| DOY*Trt*Var       | control | SBP 196 | eC wt 196 | 0.8588 | 0.2403 | 224 | 3.57  | 0.0004 |
| DOY*Trt*Var       | control | SBP 196 | eT SBP 196 | 0.62  | 0.2403 | 224 | 2.58  | 0.0105 |
| DOY*Trt*Var       | control | SBP 196 | eT wt 196 | 0.9425 | 0.2403 | 224 | 3.92  | 0.0001 |
| DOY*Trt*Var       | control | SBP 196 | eT+eC SBP 196 | 1.03 | 0.2403 | 224 | 4.29  | <.0001 |
| DOY*Trt*Var       | control | SBP 196 | eT+eC wt 196 | 0.9363 | 0.2403 | 224 | 3.9  | 0.0001 |
| DOY*Trt*Var       | control | SBP 196 | control SBP 216 | 0.3388 | 0.2403 | 224 | 1.41  | 0.16 |
| DOY*Trt*Var       | control | SBP 196 | control wt 216 | 0.2013 | 0.2403 | 224 | 0.84  | 0.4031 |
| DOY*Trt*Var       | control | SBP 196 | eC SBP 196 | 0.005 | 0.2403 | 224 | 0.02  | 0.9834 |
| DOY*Trt*Var       | control | SBP 196 | eC wt 216 | 0.0675 | 0.2403 | 224 | 0.28  | 0.779 |
| DOY*Trt*Var       | control | SBP 196 | eT SBP 216 | 0.7675 | 0.2403 | 224 | 3.19  | 0.0016 |
| DOY*Trt*Var       | control | SBP 196 | eT wt 216 | 0.8238 | 0.2403 | 224 | 3.43  | 0.0007 |
| DOY*Trt*Var       | control | SBP 196 | eT+eC SBP 216 | 0.7025 | 0.2403 | 224 | 2.92  | 0.0003 |
| DOY*Trt*Var       | control | SBP 196 | eT+eC wt 216 | 0.9525 | 0.2403 | 224 | 3.96  | <.0001 |
| DOY*Trt*Var       | control | SBP 196 | control SBP 238 | 0.1675 | 0.2403 | 224 | 0.7  | 0.4864 |
| DOY*Trt*Var       | control | SBP 196 | control wt 238 | 0.1125 | 0.2403 | 224 | 0.47  | 0.6401 |
| DOY*Trt*Var       | control | SBP 196 | eC SBP 238 | 0.4462 | 0.2403 | 224 | 1.86  | 0.0646 |
| DOY*Trt*Var       | control | SBP 196 | eC wt 238 | 0.5463 | 0.2403 | 224 | 2.27  | 0.0239 |
| DOY*Trt*Var       | control | SBP 196 | eT SBP 238 | 1.0324 | 0.2403 | 224 | 4.3  | <.0001 |
| DOY*Trt*Var       | control | SBP 196 | eT wt 238 | 0.97 | 0.2403 | 224 | 4.04  | <.0001 |
| DOY*Trt*Var       | control | SBP 196 | eT+eC SBP 238 | 0.6412 | 0.2403 | 224 | 2.67  | 0.0082 |
| DOY*Trt*Var       | control | SBP 196 | eT+eC wt 238 | 0.6925 | 0.2403 | 224 | 2.88  | 0.0043 |
| DOY*Trt*Var       | control | wt 196 | eC SBP 196 | 0.6887 | 0.2403 | 224 | 2.87  | 0.0045 |
| DOY*Trt*Var       | control | wt 196 | eC wt 196 | 0.8538 | 0.2403 | 224 | 3.55  | 0.0005 |
| DOY*Trt*Var       | control | wt 196 | eT SBP 196 | 0.615 | 0.2403 | 224 | 2.56  | 0.0111 |
| DOY*Trt*Var       | control | wt 196 | eT wt 196 | 0.9375 | 0.2403 | 224 | 3.9  | 0.0001 |
| DOY*Trt*Var       | control | wt 196 | eT+eC SBP 196 | 1.025 | 0.2403 | 224 | 4.27  | <.0001 |
| DOY*Trt*Var       | control | wt 196 | eT+eC wt 196 | 0.9313 | 0.2403 | 224 | 3.88  | 0.0001 |
| DOY*Trt*Var       | control | wt 196 | control SBP 216 | 0.3337 | 0.2403 | 224 | 1.39  | 0.1662 |
| DOY*Trt*Var       | control | wt 196 | control wt 216 | 0.1963 | 0.2403 | 224 | 0.82  | 0.4149 |
| DOY*Trt*Var       | control | wt 196 | eC SBP 216 | 0.0625 | 0.2403 | 224 | 0.26  | 0.795 |
| DOY*Trt*Var       | control | wt 196 | eT SBP 216 | 0.7625 | 0.2403 | 224 | 3.17  | 0.0017 |
| DOY*Trt*Var       | control | wt 196 | eT wt 216 | 0.8188 | 0.2403 | 224 | 3.41  | 0.0008 |
| DOY*Trt*Var       | control | wt 196 | eT+eC SBP 216 | 0.6975 | 0.2403 | 224 | 2.9  | 0.0041 |
| DOY*Trt*Var       | control | wt 196 | eT+eC wt 216 | 0.9475 | 0.2403 | 224 | 3.94  | 0.0001 |
### Supplementary Table 1. Contd.

| Treatment | DOY | Var | wt | SBP  | t   | P   |
|-----------|-----|-----|----|------|-----|-----|
| control   | 196 | control | 238 | 0.1625 | 0.2403 | 224 | 0.68 | 0.4995 |
| control   | 196 | control | 238 | 0.1075 | 0.2403 | 224 | 0.45 | 0.655 |
| control   | 196 | eC    | 238 | 0.4412 | 0.2403 | 224 | 1.84 | 0.0676 |
| control   | 196 | eT    | 238 | 0.5413 | 0.2403 | 224 | 2.25 | 0.0252 |
| control   | 196 | eT+eC | 238 | 1.0274 | 0.2403 | 224 | 4.28 | <.0001 |
| control   | 196 | eT+eC | 238 | 0.965  | 0.2403 | 224 | 4.02 | <.0001 |
| eC        | SBP | 196   | eC | 238 | 0.6362 | 0.2403 | 224 | 2.65 | 0.0087 |
| eC        | SBP | 196   | eT | 238 | 0.6075 | 0.2403 | 224 | 2.36 | 0.0046 |
| eC        | SBP | 196   | eT+eC | 238 | 0.4075 | 0.2403 | 224 | 2.06 | 0.0106 |
| eC        | SBP | 196   | eT+eC | 238 | 0.2075 | 0.2403 | 224 | 1.05 | 0.0216 |
| eC        | SBP | 196   | eT+eC | 238 | 0.1075 | 0.2403 | 224 | 0.55 | 0.0046 |
| eC        | SBP | 196   | eT+eC | 238 | 0.0075 | 0.2403 | 224 | 0.25 | 0.0046 |
Supplementary Table 1. Contd.

| DOY*Trt*Var | Var | wt | DOY | SBP | EC wt | eT wt | tSBP | tEC wt | tET wt | EC SBP | eT SBP | tET SBP | eT+eC SBP | tET+tEC SBP | eT+eC wt | eT+eC wt | tET+eC SBP | tET+eC wt |
|-------------|-----|----|-----|-----|-------|-------|------|-------|-------|--------|--------|--------|----------|------------|-----------|-----------|------------|-----------|
| eC          | 196 | eT | 216 | -0.0913 | 0.2403 | 224 | -0.38 | 0.7045 |
| eC          | 196 | eT | 216 | -0.035 | 0.2403 | 224 | -0.65 | 0.5162 |
| eC          | 196 | eT | 216 | 0.09375 | 0.2403 | 224 | -2.88 | 0.0044 |
| eC          | 196 | eT | 238 | -0.7462 | 0.2403 | 224 | -3.11 | 0.0021 |
| eC          | 196 | eT | 238 | -0.4125 | 0.2403 | 224 | -1.72 | 0.0874 |
| eC          | 196 | eT | 238 | -0.3125 | 0.2403 | 224 | -1.3 | 0.1947 |
| eC          | 196 | eT | 238 | 0.1736 | 0.2403 | 224 | 0.72 | 0.4707 |
| eC          | 196 | eT | 238 | 0.1113 | 0.2403 | 224 | 0.46 | 0.6438 |
| eC          | 196 | eT | 238 | -0.2175 | 0.2403 | 224 | -0.91 | 0.3663 |
| eC          | 196 | eT | 238 | -0.1663 | 0.2403 | 224 | -0.69 | 0.4897 |
| eC          | 196 | eT | 196 | 0.3225 | 0.2403 | 224 | 1.34 | 0.1809 |
| eC          | 196 | eT | 196 | 0.4 | 0.2403 | 224 | 1.71 | 0.0893 |
| eC          | 196 | eT | 196 | 0.3163 | 0.2403 | 224 | 1.32 | 0.1894 |
| eC          | 196 | eT | 196 | -0.2813 | 0.2403 | 224 | -1.17 | 0.243 |
| eC          | 196 | eT | 196 | -0.4187 | 0.2403 | 224 | -1.74 | 0.0827 |
| eC          | 196 | eT | 216 | -0.615 | 0.2403 | 224 | -2.56 | 0.0111 |
| eC          | 196 | eT | 216 | -0.5525 | 0.2403 | 224 | -2.3 | 0.0224 |
| eC          | 196 | eT | 216 | 0.1475 | 0.2403 | 224 | 0.61 | 0.5399 |
| eC          | 196 | eT | 216 | 0.2038 | 0.2403 | 224 | 0.85 | 0.3973 |
| eC          | 196 | eT | 216 | 0.0825 | 0.2403 | 224 | 0.34 | 0.7316 |
| eC          | 196 | eT | 216 | 0.3325 | 0.2403 | 224 | 1.38 | 0.1678 |
| eC          | 196 | eT | 216 | -0.4525 | 0.2403 | 224 | -1.88 | 0.061 |
| eC          | 196 | eT | 216 | -0.5075 | 0.2403 | 224 | -2.11 | 0.0358 |
| eC          | 196 | eT | 238 | -0.1738 | 0.2403 | 224 | -0.72 | 0.4703 |
| eC          | 196 | eT | 238 | -0.0738 | 0.2403 | 224 | -0.31 | 0.7592 |
| eC          | 196 | eT | 238 | 0.4124 | 0.2403 | 224 | 1.72 | 0.0875 |
| eC          | 196 | eT | 238 | 0.35 | 0.2403 | 224 | 1.46 | 0.1466 |
| eC          | 196 | eT | 238 | 0.02125 | 0.2403 | 224 | 0.09 | 0.9296 |
| eC          | 196 | eT | 238 | 0.0725 | 0.2403 | 224 | 0.3 | 0.7631 |
| eC          | 196 | eT | 196 | 0.0875 | 0.2403 | 224 | 0.36 | 0.7161 |
| eC          | 196 | eT | 196 | -0.0063 | 0.2403 | 224 | -0.03 | 0.9793 |
| eC          | 196 | eT | 216 | -0.6038 | 0.2403 | 224 | -2.51 | 0.0127 |
| eC          | 196 | eT | 216 | -0.7412 | 0.2403 | 224 | -3.09 | 0.0023 |
| eC          | 196 | eT | 216 | -0.9375 | 0.2403 | 224 | -3.9 | 0.0001 |
| eC          | 196 | eT | 216 | -0.875 | 0.2403 | 224 | -3.64 | 0.0003 |
### Supplementary Table 1. Contd.

| DOY*Trt*Var | eT  | wt | 196 | eT  | SBP  | 216 | -0.175 | 0.2403 | 224 | -0.73 | 0.4672 |
|-------------|-----|----|-----|-----|------|-----|--------|------|-----|-------|--------|
| DOY*Trt*Var | eT  | wt | 196 | eT  | wt   | 216 | -0.1188| 0.2403| 224 | -0.49 | 0.6216 |
| DOY*Trt*Var | eT  | wt | 196 | eT+eC| SBP  | 216 | -0.24  | 0.2403| 224 | -1    | 0.3189 |
| DOY*Trt*Var | eT  | wt | 196 | eT+eC| wt   | 216 | 0.01   | 0.2403| 224 | 0.04  | 0.9668 |
| DOY*Trt*Var | eT  | wt | 196 | control| SBP  | 238 | -0.775 | 0.2403| 224 | -3.23 | 0.0014 |
| DOY*Trt*Var | eT  | wt | 196 | control| wt   | 238 | -0.83  | 0.2403| 224 | -3.45 | 0.0007 |
| DOY*Trt*Var | eT  | wt | 196 | eC   | SBP  | 238 | -0.4963| 0.2403| 224 | -2.07 | 0.04   |
| DOY*Trt*Var | eT  | wt | 196 | eC   | wt   | 238 | -0.3962| 0.2403| 224 | -1.65 | 0.1005 |
| DOY*Trt*Var | eT  | wt | 196 | eT   | SBP  | 238 | 0.08987| 0.2403| 224 | 0.37  | 0.7087 |
| DOY*Trt*Var | eT  | wt | 196 | eT   | wt   | 238 | 0.0275 | 0.2403| 224 | 0.11  | 0.909  |
| DOY*Trt*Var | eT  | wt | 196 | eT+eC| SBP  | 238 | -0.3013| 0.2403| 224 | -1.25 | 0.2112 |
| DOY*Trt*Var | eT  | wt | 196 | eT+eC| wt   | 238 | -0.25  | 0.2403| 224 | -1.04 | 0.2992 |
| DOY*Trt*Var | eT+eC| SBP | 196 | eT+eC| wt   | 196 | -0.0938| 0.2403| 224 | -0.39 | 0.6968 |
| DOY*Trt*Var | eT+eC| SBP | 196 | control| SBP  | 216 | -0.6912| 0.2403| 224 | -2.88 | 0.0044 |
| DOY*Trt*Var | eT+eC| SBP | 196 | control| wt   | 216 | -0.8287| 0.2403| 224 | -3.45 | 0.0007 |
| DOY*Trt*Var | eT+eC| SBP | 196 | eC   | SBP  | 216 | -1.025 | 0.2403| 224 | -4.27 | <.0001 |
| DOY*Trt*Var | eT+eC| SBP | 196 | eC   | wt   | 216 | -0.9625| 0.2403| 224 | -4.01 | <.0001 |
| DOY*Trt*Var | eT+eC| SBP | 196 | eT   | SBP  | 216 | -0.2625| 0.2403| 224 | -1.09 | 0.2758 |
| DOY*Trt*Var | eT+eC| SBP | 196 | eT   | wt   | 216 | -0.2062| 0.2403| 224 | -0.86 | 0.3916 |
| DOY*Trt*Var | eT+eC| SBP | 196 | eT+eC| SBP  | 216 | -0.3275| 0.2403| 224 | -1.36 | 0.1742 |
| DOY*Trt*Var | eT+eC| SBP | 196 | eT+eC| wt   | 216 | -0.0775| 0.2403| 224 | -0.32 | 0.7473 |
| DOY*Trt*Var | eT+eC| SBP | 196 | control| SBP  | 238 | -0.8625| 0.2403| 224 | -3.59 | 0.0004 |
| DOY*Trt*Var | eT+eC| SBP | 196 | control| wt   | 238 | -0.9175| 0.2403| 224 | -3.82 | 0.0002 |
| DOY*Trt*Var | eT+eC| SBP | 196 | eC   | SBP  | 238 | -0.5838| 0.2403| 224 | -2.43 | 0.0159 |
| DOY*Trt*Var | eT+eC| SBP | 196 | eC   | wt   | 238 | -0.4837| 0.2403| 224 | -2.01 | 0.0453 |
| DOY*Trt*Var | eT+eC| SBP | 196 | eT   | SBP  | 238 | 0.00238| 0.2403| 224 | 0.01  | 0.9921 |
| DOY*Trt*Var | eT+eC| SBP | 196 | eT   | wt   | 238 | -0.06  | 0.2403| 224 | -0.25 | 0.803  |
| DOY*Trt*Var | eT+eC| SBP | 196 | eT+eC| SBP  | 238 | -0.3888| 0.2403| 224 | -1.62 | 0.1071 |
| DOY*Trt*Var | eT+eC| SBP | 196 | eT+eC| wt   | 238 | -0.3375| 0.2403| 224 | -1.4  | 0.1615 |
| DOY*Trt*Var | eT+eC| wt | 196 | control| SBP  | 216 | -0.5975| 0.2403| 224 | -2.49 | 0.0136 |
| DOY*Trt*Var | eT+eC| wt | 196 | control| wt   | 216 | -0.735  | 0.2403| 224 | -3.06 | 0.0025 |
| DOY*Trt*Var | eT+eC| wt | 196 | eC   | SBP  | 216 | -0.9313| 0.2403| 224 | -3.88 | 0.0001 |
| DOY*Trt*Var | eT+eC| wt | 196 | eC   | wt   | 216 | -0.8688| 0.2403| 224 | -3.62 | 0.0004 |
| DOY*Trt*Var | eT+eC| wt | 196 | eT   | SBP  | 216 | -0.1688| 0.2403| 224 | -0.7  | 0.4832 |
| DOY*Trt*Var | eT+eC| wt | 196 | eT   | wt   | 216 | -0.1125| 0.2403| 224 | -0.47 | 0.6401 |
| DOY*Trt*Var | eT+eC| wt | 196 | eT+eC| SBP  | 216 | -0.2338| 0.2403| 224 | -0.97 | 0.3317 |
| DOY*Trt*Var | eT+eC| wt | 196 | eT+eC| wt   | 216 | 0.01625| 0.2403| 224 | 0.07  | 0.9461 |
Supplementary Table 1. Contd.

| DOY*Trt*Var | eT+eC | wt | 196 | control | SBP | 238 | -0.7688 | 0.2403 | 224 | -3.2  | 0.0016 |
|-------------|-------|----|-----|---------|-----|-----|---------|--------|-----|-------|---------|
| DOY*Trt*Var | eT+eC | wt | 196 | control | wt  | 238 | -0.8237 | 0.2403 | 224 | -3.43  | 0.0007 |
| DOY*Trt*Var | eT+eC | wt | 196 | eC     | SBP | 238 | -0.49   | 0.2403 | 224 | -2.04  | 0.0426 |
| DOY*Trt*Var | eT+eC | wt | 196 | eC     | wt  | 238 | -0.39   | 0.2403 | 224 | -1.62  | 0.106  |
| DOY*Trt*Var | eT+eC | wt | 196 | eT     | SBP | 238 | 0.09612 | 0.2403 | 224 | 0.4    | 0.6895 |
| DOY*Trt*Var | eT+eC | wt | 196 | eT     | wt  | 238 | 0.03375 | 0.2403 | 224 | 0.14   | 0.8884 |
| DOY*Trt*Var | eT+eC | wt | 196 | eT+eC  | SBP | 238 | -0.295  | 0.2403 | 224 | -1.23  | 0.2208 |
| DOY*Trt*Var | eT+eC | wt | 196 | eT+eC  | wt  | 238 | -0.2438 | 0.2403 | 224 | -1.01  | 0.3114 |
| DOY*Trt*Var | control SBP | 216 | control | wt  | 216 | -0.1375 | 0.2403 | 224 | -0.57  | 0.5677 |
| DOY*Trt*Var | control SBP | 216 | eC     | SBP  | 216 | -0.3337 | 0.2403 | 224 | -1.39  | 0.1662 |
| DOY*Trt*Var | control SBP | 216 | eC     | wt   | 216 | -0.2712 | 0.2403 | 224 | -1.13  | 0.2601 |
| DOY*Trt*Var | control SBP | 216 | eT     | SBP  | 216 | 0.4288  | 0.2403 | 224 | 1.78   | 0.0757 |
| DOY*Trt*Var | control SBP | 216 | eT     | wt   | 216 | 0.485   | 0.2403 | 224 | 2.02   | 0.0447 |
| DOY*Trt*Var | control SBP | 216 | eT+eC  | SBP  | 216 | 0.3637  | 0.2403 | 224 | 1.51   | 0.1314 |
| DOY*Trt*Var | control SBP | 216 | eT+eC  | wt   | 216 | 0.6138  | 0.2403 | 224 | 2.55   | 0.0113 |
| DOY*Trt*Var | control SBP | 216 | control SBP | 216 | -0.1713 | 0.2403 | 224 | -0.71  | 0.4767 |
| DOY*Trt*Var | control SBP | 216 | control SBP | wt | 216 | -0.2262 | 0.2403 | 224 | -0.94  | 0.3474 |
| DOY*Trt*Var | control SBP | 216 | eC     | SBP  | 216 | 0.1075  | 0.2403 | 224 | 0.45   | 0.655  |
| DOY*Trt*Var | control SBP | 216 | eC     | wt   | 216 | 0.2075  | 0.2403 | 224 | 0.86   | 0.3887 |
| DOY*Trt*Var | control SBP | 216 | eT     | SBP  | 216 | 0.6936  | 0.2403 | 224 | 2.89   | 0.0043 |
| DOY*Trt*Var | control SBP | 216 | eT     | wt   | 216 | 0.6313  | 0.2403 | 224 | 2.63   | 0.0092 |
| DOY*Trt*Var | control SBP | 216 | eT+eC  | SBP  | 216 | 0.3025  | 0.2403 | 224 | 1.26   | 0.2093 |
| DOY*Trt*Var | control SBP | 216 | eT+eC  | wt   | 216 | 0.3537  | 0.2403 | 224 | 1.47   | 0.1423 |
| DOY*Trt*Var | control wt | 216 | eC     | SBP  | 216 | -0.1963 | 0.2403 | 224 | -0.82  | 0.4149 |
| DOY*Trt*Var | control wt | 216 | eC     | wt   | 216 | -0.1338 | 0.2403 | 224 | -0.56  | 0.5783 |
| DOY*Trt*Var | control wt | 216 | eT     | SBP  | 216 | 0.5662  | 0.2403 | 224 | 2.36   | 0.0193 |
| DOY*Trt*Var | control wt | 216 | eT     | wt   | 216 | 0.6225  | 0.2403 | 224 | 2.59   | 0.0102 |
| DOY*Trt*Var | control wt | 216 | eT+eC  | SBP  | 216 | 0.5012  | 0.2403 | 224 | 2.09   | 0.0381 |
| DOY*Trt*Var | control wt | 216 | eT+eC  | wt   | 216 | 0.7513  | 0.2403 | 224 | 3.13   | 0.002  |
| DOY*Trt*Var | control wt | 216 | control SBP | 216 | -0.0338 | 0.2403 | 224 | -0.14  | 0.8884 |
| DOY*Trt*Var | control wt | 216 | control SBP | wt | 216 | -0.0888 | 0.2403 | 224 | -0.37  | 0.7122 |
| DOY*Trt*Var | control wt | 216 | eC     | SBP  | 216 | 0.245   | 0.2403 | 224 | 1.02   | 0.309  |
| DOY*Trt*Var | control wt | 216 | eC     | wt   | 216 | 0.345   | 0.2403 | 224 | 1.44   | 0.1524 |
| DOY*Trt*Var | control wt | 216 | eT     | SBP  | 216 | 0.8311  | 0.2403 | 224 | 3.46   | 0.0006 |
| DOY*Trt*Var | control wt | 216 | eT     | wt   | 216 | 0.7688  | 0.2403 | 224 | 3.2    | 0.0016 |
| DOY*Trt*Var | control wt | 216 | eT+eC  | SBP  | 216 | 0.44    | 0.2403 | 224 | 1.83   | 0.0684 |
| DOY*Trt*Var | control wt | 216 | eT+eC  | wt   | 216 | 0.4912  | 0.2403 | 224 | 2.04   | 0.0421 |
### Supplementary Table 1. Contd.

| DOY*Trt*Var | eC   | SBP  | 216  | eC   | wt  | 216  | 0.0625 | 0.2403 | 224  | 0.26 | 0.795 |
|-------------|------|------|------|------|-----|------|--------|--------|------|------|-------|
| DOY*Trt*Var | eC   | SBP  | 216  | eT   | SBP  | 216  | 0.7625 | 0.2403 | 224  | 3.17 | 0.0017 |
| DOY*Trt*Var | eC   | SBP  | 216  | eT   | wt   | 216  | 0.8188 | 0.2403 | 224  | 3.41 | 0.0008 |
| DOY*Trt*Var | eC   | SBP  | 216  | eT+eC| SBP  | 216  | 0.6975 | 0.2403 | 224  | 2.9  | 0.0041 |
| DOY*Trt*Var | eC   | SBP  | 216  | eT+eC| wt   | 216  | 0.9475 | 0.2403 | 224  | 3.94 | 0.0001 |
| DOY*Trt*Var | eC   | SBP  | 216  | control| SBP  | 238  | 0.1625 | 0.2403 | 224  | 0.68 | 0.4995 |
| DOY*Trt*Var | eC   | SBP  | 216  | control| wt   | 238  | 0.1075 | 0.2403 | 224  | 0.45 | 0.655 |
| DOY*Trt*Var | eC   | SBP  | 216  | eC   | SBP  | 238  | 0.4412 | 0.2403 | 224  | 1.84 | 0.0676 |
| DOY*Trt*Var | eC   | SBP  | 216  | eC   | wt   | 238  | 0.5413 | 0.2403 | 224  | 2.25 | 0.0252 |
| DOY*Trt*Var | eC   | SBP  | 216  | eT   | SBP  | 238  | 1.0274 | 0.2403 | 224  | 4.28 | <0.001 |
| DOY*Trt*Var | eC   | SBP  | 216  | eT   | wt   | 238  | 0.965  | 0.2403 | 224  | 4.02 | <0.001 |
| DOY*Trt*Var | eC   | SBP  | 216  | eT+eC| SBP  | 238  | 0.6362 | 0.2403 | 224  | 2.65 | 0.0087 |
| DOY*Trt*Var | eC   | SBP  | 216  | eT+eC| wt   | 238  | 0.6875 | 0.2403 | 224  | 2.86 | 0.0046 |
| DOY*Trt*Var | eC   | wt   | 216  | eT   | SBP  | 216  | 0.7    | 0.2403 | 224  | 2.91 | 0.0039 |
| DOY*Trt*Var | eC   | wt   | 216  | eT   | wt   | 216  | 0.7563 | 0.2403 | 224  | 3.15 | 0.0019 |
| DOY*Trt*Var | eC   | wt   | 216  | eT+eC | SBP  | 216  | 0.635  | 0.2403 | 224  | 2.64 | 0.0088 |
| DOY*Trt*Var | eC   | wt   | 216  | eT+eC | wt   | 216  | 0.885  | 0.2403 | 224  | 3.68 | 0.0003 |
| DOY*Trt*Var | eC   | wt   | 216  | control| SBP  | 238  | 0.1    | 0.2403 | 224  | 0.42 | 0.6777 |
| DOY*Trt*Var | eC   | wt   | 216  | control| wt   | 238  | 0.045  | 0.2403 | 224  | 0.19 | 0.8516 |
| DOY*Trt*Var | eC   | wt   | 216  | eC   | SBP  | 238  | 0.3787 | 0.2403 | 224  | 1.58 | 0.1163 |
| DOY*Trt*Var | eC   | wt   | 216  | eC   | wt   | 238  | 0.4788 | 0.2403 | 224  | 1.99 | 0.0475 |
| DOY*Trt*Var | eC   | wt   | 216  | eT   | SBP  | 238  | 0.9649 | 0.2403 | 224  | 4.02 | <0.001 |
| DOY*Trt*Var | eC   | wt   | 216  | eT   | wt   | 238  | 0.9025 | 0.2403 | 224  | 3.76 | 0.0002 |
| DOY*Trt*Var | eC   | wt   | 216  | eT+eC| SBP  | 238  | 0.5737 | 0.2403 | 224  | 2.39 | 0.0178 |
| DOY*Trt*Var | eC   | wt   | 216  | eT+eC | wt   | 238  | 0.625  | 0.2403 | 224  | 2.6  | 0.0099 |
| DOY*Trt*Var | eT   | SBP  | 216  | eT   | wt   | 216  | 0.05625| 0.2403 | 224  | 0.23 | 0.8151 |
| DOY*Trt*Var | eT   | SBP  | 216  | eT+eC| SBP  | 216  | -0.065 | 0.2403 | 224  | -0.27 | 0.787 |
| DOY*Trt*Var | eT   | SBP  | 216  | eT+eC| wt   | 216  | 0.185  | 0.2403 | 224  | 0.77 | 0.4421 |
| DOY*Trt*Var | eT   | SBP  | 216  | control| SBP  | 238  | -0.6   | 0.2403 | 224  | -2.5 | 0.0132 |
| DOY*Trt*Var | eT   | SBP  | 216  | control| wt   | 238  | -0.655 | 0.2403 | 224  | -2.73 | 0.0069 |
| DOY*Trt*Var | eT   | SBP  | 216  | eC   | SBP  | 238  | -0.3213| 0.2403 | 224  | -1.34 | 0.1826 |
| DOY*Trt*Var | eT   | SBP  | 216  | eC   | wt   | 238  | -0.2212| 0.2403 | 224  | -0.92 | 0.3581 |
| DOY*Trt*Var | eT   | SBP  | 216  | eT   | SBP  | 238  | 0.2649 | 0.2403 | 224  | 1.1  | 0.2715 |
| DOY*Trt*Var | eT   | SBP  | 216  | eT   | wt   | 238  | 0.2025 | 0.2403 | 224  | 0.84 | 0.4002 |
| DOY*Trt*Var | eT   | SBP  | 216  | eT+eC| SBP  | 238  | -0.1263| 0.2403 | 224  | -0.53 | 0.5998 |
| DOY*Trt*Var | eT   | SBP  | 216  | eT+eC| wt   | 238  | -0.075 | 0.2403 | 224  | -0.31 | 0.7552 |
| DOY*Trt*Var | eT   | wt   | 216  | eT+eC| SBP  | 216  | -0.1213| 0.2403 | 224  | -0.5 | 0.6143 |
**Supplementary Table 1. Contd.**

| DOY*Trt*Var | Var     | wt  | 216 | eT+eC | wt  | 216 | t | 216 | 0.1288 | 0.2403 | 224 | 0.54 | 0.5926 |
|-------------|---------|-----|-----|-------|-----|-----|---|-----|--------|--------|-----|------|--------|
| eT          | control | SBP | 238 | -0.6563 | 0.2403 | 224 | -2.73 | 0.0068 |
| eT          | control | wt  | 238 | -0.7112 | 0.2403 | 224 | -2.96 | 0.0034 |
| eT          | eC      | SBP | 238 | -0.3775 | 0.2403 | 224 | -1.57 | 0.1176 |
| eT          | eC      | wt  | 238 | -0.2775 | 0.2403 | 224 | -1.15 | 0.2493 |
| eT          | eT      | SBP | 238 | 0.2086  | 0.2403 | 224 | 0.87  | 0.3862 |
| eT          | eT      | wt  | 238 | 0.1463  | 0.2403 | 224 | 0.61  | 0.5433 |
| eT          | eT+eC   | SBP | 238 | -0.1825 | 0.2403 | 224 | -0.76 | 0.4483 |
| eT          | eT+eC   | wt  | 238 | -0.1313 | 0.2403 | 224 | -0.55 | 0.5854 |
| eT+eC       | SBP     | wt  | 216 | 0.25    | 0.2403 | 224 | 1.04  | 0.2992 |
| eT+eC       | SBP     | control | SBP | 238 | -0.535  | 0.2403 | 224 | -2.23 | 0.027  |
| eT+eC       | SBP     | control | wt  | 238 | -0.59   | 0.2403 | 224 | -2.46 | 0.0148 |
| eT+eC       | SBP     | eC  | 238 | -0.2563 | 0.2403 | 224 | -1.07 | 0.2873 |
| eT+eC       | SBP     | eC  | 238 | -0.1562 | 0.2403 | 224 | -0.65 | 0.5162 |
| eT+eC       | SBP     | eT  | 238 | 0.3299  | 0.2403 | 224 | 1.37  | 0.1711 |
| eT+eC       | SBP     | eT  | 238 | 0.2675  | 0.2403 | 224 | 1.11  | 0.2668 |
| eT+eC       | SBP     | eT+eC | SBP | 238 | -0.0613 | 0.2403 | 224 | -0.25 | 0.799  |
| eT+eC       | SBP     | eT+eC | wt  | 238 | -0.01   | 0.2403 | 224 | -0.04 | 0.9668 |
| eT+eC       | wt      | control | SBP | 238 | -0.785  | 0.2403 | 224 | -3.27 | 0.0013 |
| eT+eC       | wt      | control | wt  | 238 | -0.84   | 0.2403 | 224 | -3.5  | 0.0006 |
| eT+eC       | wt      | eC  | 238 | -0.5063 | 0.2403 | 224 | -2.11 | 0.0362 |
| eT+eC       | wt      | eC  | 238 | -0.4062 | 0.2403 | 224 | -1.69 | 0.0923 |
| eT+eC       | wt      | eT  | 238 | 0.07987 | 0.2403 | 224 | 0.33  | 0.7399 |
| eT+eC       | wt      | eT  | 238 | 0.0175  | 0.2403 | 224 | 0.07  | 0.942  |
| eT+eC       | wt      | eT+eC | SBP | 238 | -0.3113 | 0.2403 | 224 | -1.3  | 0.1965 |
| eT+eC       | wt      | eT+eC | wt  | 238 | -0.06   | 0.2403 | 224 | -1.08 | 0.2804 |
| control     | SBP     | control | wt  | 238 | -0.055  | 0.2403 | 224 | -0.23 | 0.8191 |
| control     | SBP     | eC  | 238 | 0.2788  | 0.2403 | 224 | 1.16  | 0.2472 |
| control     | SBP     | eC  | 238 | 0.3788  | 0.2403 | 224 | 1.58  | 0.1163 |
| control     | SBP     | eT  | 238 | 0.8649  | 0.2403 | 224 | 3.6   | 0.0004 |
| control     | SBP     | eT  | 238 | 0.8025  | 0.2403 | 224 | 3.34  | 0.001  |
| control     | SBP     | eT+eC | SBP | 238 | 0.4737  | 0.2403 | 224 | 1.97  | 0.0499 |
| control     | SBP     | eT+eC | wt  | 238 | 0.525   | 0.2403 | 224 | 2.19  | 0.0299 |
| control     | eC      | SBP | 238 | 0.3337  | 0.2403 | 224 | 1.39  | 0.1662 |
| control     | eC      | wt  | 238 | 0.4337  | 0.2403 | 224 | 1.81  | 0.0724 |
| control     | eT      | SBP | 238 | 0.9199  | 0.2403 | 224 | 3.83  | 0.0002 |
| control     | eT      | wt  | 238 | 0.8575  | 0.2403 | 224 | 3.57  | 0.0004 |
### Supplementary Table 1. Contd.

| DOY*Trt*Var | control | wt 238 | eT+eC | SBP   | 238 | 0.5287 | 0.2403 | 224 | 2.2  | 0.0288 |
|-------------|---------|--------|-------|-------|-----|--------|--------|-----|------|--------|
| DOY*Trt*Var | control | wt 238 | eT+eC | wt    | 238 | 0.58   | 0.2403 | 224 | 2.41 | 0.0166 |
| DOY*Trt*Var | eC      | SBP 238| eC    | wt    | 238 | 0.1    | 0.2403 | 224 | 0.42 | 0.6777 |
| DOY*Trt*Var | eC      | SBP 238| eT    | SBP   | 238 | 0.5861 | 0.2403 | 224 | 2.44 | 0.0155 |
| DOY*Trt*Var | eC      | SBP 238| eT    | wt    | 238 | 0.5238 | 0.2403 | 224 | 2.18 | 0.0303 |
| DOY*Trt*Var | eC      | SBP 238| eT+eC| SBP   | 238 | 0.195  | 0.2403 | 224 | 0.81 | 0.4179 |
| DOY*Trt*Var | eC      | wt 238 | eT    | SBP   | 238 | 0.4861 | 0.2403 | 224 | 2.02 | 0.0442 |
| DOY*Trt*Var | eC      | wt 238 | eT    | wt    | 238 | 0.4237 | 0.2403 | 224 | 1.76 | 0.0792 |
| DOY*Trt*Var | eC      | wt 238 | eT+eC| SBP   | 238 | 0.095  | 0.2403 | 224 | 0.4  | 0.6929 |
| DOY*Trt*Var | eC      | wt 238 | eT+eC| wt    | 238 | 0.1462 | 0.2403 | 224 | 0.61 | 0.5433 |
| DOY*Trt*Var | eT      | SBP 238| eT    | wt    | 238 | -0.0624| 0.2403 | 224 | -0.26| 0.7954 |
| DOY*Trt*Var | eT      | SBP 238| eT+eC| SBP   | 238 | -0.3911| 0.2403 | 224 | -1.63| 0.105 |
| DOY*Trt*Var | eT      | SBP 238| eT+eC| wt    | 238 | -0.3399| 0.2403 | 224 | -1.41| 0.1586 |
| DOY*Trt*Var | eT      | wt 238 | eT+eC| SBP   | 238 | -0.3288| 0.2403 | 224 | -1.37| 0.1726 |
| DOY*Trt*Var | eT      | wt 238 | eT+eC| wt    | 238 | -0.2775| 0.2403 | 224 | -1.15| 0.2493 |
| DOY*Trt*Var | eT+eC   | SBP 238| eT+eC| wt    | 238 | 0.05125| 0.2403 | 224 | 0.21 | 0.8313 |