**Paper title:** Magnitude of temporal fluctuations of composite environment and their impacts on *Cassia auriculata* (Linn.) performance

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**Table S1.** ANOVA analysis for different plant traits.

|  |  |  |
| --- | --- | --- |
| **Plant height** | | |
| Source of Variation | Mean of Square | Computed F Value |
| Events | 5.28 | 1059\* |
| Sites | 4.00 | 46.24\* |
| Event × Site | 3.33 | 23.91\* |
| **Plant cover** | | |
| Source of Variation | Mean of Square | Computed F Value |
| Events | 2.28 | 133177.2\* |
| Sites | 1.05 | 42.05\* |
| Event × Site | 6.02 | 14.77\* |
| **Canopy volume** | | |
| Source of Variation | Mean of Square | Computed F Value |
| Events | 3.57 | 4678.9\* |
| Sites | 1.65 | 112.75\* |
| Event × Site | 4.06 | 44.38\* |
| **Biomass** | | |
| Source of Variation | Mean of Square | Computed F Value |
| Events | 1337.2 | 133.12\* |
| Sites | 7.71 | 2.28**NS** |
| Event × Site | 10.26 | 1.175**NS** |
| **Plant organic carbon** | | |
| Source of Variation | Mean of Square | Computed F Value |
| Events | 9332.41 | 14839.12\* |
| Sites | 1.00 | 216.06\* |
| Event × Site | 96.08 | 89.97\* |
| **Plant nitrogen** | | |
| Source of Variation | Mean of Square | Computed F Value |
| Events | 1333.22 | 71853.58\* |
| Sites | 12.14 | 114.38\* |
| Event x Site | 16.29 | 146.47\* |
| **Plant ash** | | |
| Source of Variation | Mean of Square | Computed F Value |
| Events | 0.53 | 4321.65\* |
| Sites | 2.34 | 386.37\* |
| Event x Site | 4.109 | 430.92\* |

NS = Non-significant; \* = 95% and \*\* =99% significant level.

**Table** S2Student *t*-test for community and soil parameters.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Inter-pulse | Non-pulse |  |  | Inter-pulse | Non-pulse |
| RIV | Pulse | 2.16 | 5.05\*\* | pH | Pulse | 3.65\*\* | 5.03\*\* |
| Inter-pulse | - | 2.63\*\* | Inter-pulse | - | 1.67 |
| Richness | Pulse | 8.94\*\* | 10.25\*\* | Nitrogen | Pulse | 3.90\*\* | 3.02\*\* |
| Inter-pulse | - | 4.39\*\* | Inter-pulse | - | -1.21 |
| Shannon | Pulse | 4.10\*\* | 6.19\*\* | Phosphorus | Pulse | 2.21\*\* | 5.24\*\* |
| Inter-pulse | - | 2.98\*\* | Inter-pulse | - | 6.98\*\* |
| Simpson | Pulse | 4.00\*\* | 8.12\*\* | Electric Conductivity | Pulse | 0.62NS | 1.48 NS |
| Inter-pulse | - | 7.13\*\* | Inter-pulse | - | 2.45 NS |
| Evenness | Pulse | 12.84\*\* | 11.82\*\* | Moisture | Pulse | 6.85\*\* | 6.21\*\* |
| Inter-pulse | - | 8.26\*\* | Inter-pulse | - | 4.81\*\* |
| Organic Carbon | Pulse | 7.53\*\* | 13.65\*\* |  |  |  |  |
| Inter-pulse | - | 1.52 |  |  |  |  |

NS = Non-significant; \* = 95% and \*\* = 99% significant level.

**Table S3.** Bartlett's sphericity and Kaiser-Meyer-Olkin sampling adequacy tests

|  |  |
| --- | --- |
| Parameters | Values |
| Chi-square (Observed value) | 304.60 |
| Chi-square (Critical value) | 119.9 |
| *P*-value | < 0.0001 |
| Alpha | 0.05 |
| Kaiser-Meyer-Olkin (KMO) | 0.784 |

**Table S4** Eigen value analysis and other attributes obtained from PCA

|  |  |  |
| --- | --- | --- |
| Variables | F1 | F2 |
| Eigen value | 25.242 | 8.758 |
| % variance | 74.243 | 25.757 |
| Cumulative % | 74.243 | 100.000 |
| Heat Index | -0.142 | -0.990 |
| Potential evapotranspiration (PET, mm) | 0.840 | 0.542 |
| Actual evapotranspiration (AET, mm) | -0.996 | 0.090 |
| Transpiration | -0.996 | 0.085 |
| Latent Heat (λv Cal g–1) | 0.113 | 0.994 |
| Rn( Net radiation, MJm-2 day-1) | 0.290 | -0.957 |
| Rns(incoming net shortwave radiation, MJ m–2 day–1) | 0.864 | -0.503 |
| Rnl (Outgoing net long-wave radiation, MJ m–2 day–1) | 0.856 | 0.517 |
| Ra (Extraterrestrial radiation, MJ m–2 day–1) | -0.293 | -0.956 |
| ea (Actual vapour pressure, kPa) | -0.138 | -0.990 |
| Rs (Incoming Solar radiation, MJ m–2 day–1) | 0.865 | -0.501 |
| Rm (Maintenance Respiration (Total R - Construction Rc) | 0.792 | -0.611 |
| Rc (Construction Cost (CC, g glucose g–1  DW) | 0.988 | -0.156 |
| Total respiration | 0.825 | -0.565 |
| NPP (Net Primary Production) | 0.994 | 0.106 |
| GPP (Gross Primary Production) | 0.989 | -0.151 |
| CUE (Carbon Use Efficiency i.e. NPP:GPP) | 0.711 | 0.703 |
| R:GPP | -0.711 | -0.703 |
| C (Mg ha–1) | -0.990 | -0.139 |
| Conversion efficiency of the annual incoming solar energy to GPP | -0.964 | -0.266 |
| Height (m) | 0.966 | -0.259 |
| Canopy Volume | 0.972 | 0.234 |
| Cover | 1.000 | 0.014 |
| Relative Importance Value of *C. auriculata* | 0.936 | -0.353 |
| Richness | -0.996 | 0.091 |
| Shannon and Weaver Index (H′) | -1.000 | 0.024 |
| Simpson Index | 0.975 | -0.224 |
| Evenness | -0.989 | 0.147 |
| Soil organic carbon | 0.983 | 0.186 |
| Soil Phosphorus | -0.941 | 0.338 |
| Soil nitrogen | 1.000 | -0.029 |
| Soil pH | -0.762 | -0.647 |
| Soil electric conductivity | -0.955 | 0.296 |
| Soil moisture | -0.957 | -0.289 |

Table S5. Regression equations with independent and dependent variables

|  |  |  |
| --- | --- | --- |
| Independent Variable | Dependent Variable | Equation (Relation type) |
| Energy Variables | | |
| Incoming net shortwave radiation (Rns) | maintenance respiration (Rm) | Rm = 98581+1186.30 Rns+−40.76 Rns^2; R2 =1.00\*\* (quadratic) |
| Incoming net shortwave radiation (Rns) | total respiration | Total Respiration = −9561+1321.27 × Rns+−45.36 × Rns^2; R2 =1.00\*\* (quadratic) |
| Incoming solar radiation | maintenance respiration (Rm) | Rm = 3165.05+-346.23 Rs+9.53Rs^2; R2 =1.00\*\* (quadratic) |
| Incoming solar radiation | total respiration | Total Respiration = 3166.77 +−347.25 × Rs +9.60 × Rs^2; R2 =1.00\*\* (quadratic fashion) |
| Actual Evapotranspiration (AET) | Construction Respiration | Construction Respiration = 13.86+−0.148 × AET, R2 = 0.99\*\* (Linear) |
| Actual Evapotranspiration (AET) | Gross Primary Productivity (GPP) | GPP = 181.58+−11.17 × AET; R2 = 0.99\*\* (Linear) |
| Transpiration | Construction Respiration | Construction Respiration = 13.75+−0.21 × Transpiration, R2 = 0.99\*\*(Linear) |
| Transpiration | Gross Primary Productivity (GPP) | GPP = 218.62+−4.65 × Transpiration; R2 = 0.99\*\*(Linear) |
| Actual Evapotranspiration (AET) | Canopy Volume | Canopy Volume = 0.547+0.099 × AET+−0.010 × AET^2; R2 = 1.00\*\*(quadratic) |
| Transpiration | Canopy Volume | Canopy Volume = −0.0877+0.0865 × transpiration +−0.0021 × transpiration ^2; R2 = 1.00\*\*(quadratic) |
| Community Variables | | |
| Species Richness | Construction Respiration | Construction Respiration = 12.47+–0.538 × Richness; R2 = 0. 99\*\* (Linear) |
| Species Richness | Gross Primary Productivity (GPP) | GPP = 190.75+–11.67 × Richness; R2 = 0.99\*\* (Linear) |
| Species Richness | Plant Cover | Cover = 2.15 +–0.11 × Richness; R2 = 0.99\*\* (Linear) |
| Evenness | Construction Respiration | (Construction respiration = 42.57 +–41.49 × evenness; R2 = 0. 99\*\* (Linear) |
| Evenness | Gross Primary Productivity (GPP) | GPP = 843.19 +–899.29 × Evenness; R2 = 0.99\*\* (Linear) |
| Evenness | Plant Height | Height = 20.47 e^ (-3.52 × Evenness); R2 = 0. 99\*\* (exponential) |
| Shannon and Weaver index (H′) | Construction Respiration | Construction Respiration = 11.32 × Shannon and Weaver Index ^-0.8434; R2 = 0.99\*\* (Power) |
| Shannon and Weaver index (H′) | Gross Primary Productivity (GPP) | GPP = 455.84 e^(-1.040 × Shannon and Weaver Index; R2 = 0.99\*\* (exponential) |
| Shannon and Weaver index (H′) | Net Primary Productivity (NPP) | NPP = 145.34+–57.88 × Shannon and Weaver Index; R2 = -0. 99\*\* (Linear) |
| Shannon and Weaver index (H′) | Plant Cover | Cover = 2.59 +–0.873 × Shannon and Weaver Index; R2 = 0.99\* (Linear) |
| Soil Variables | | |
| Soil Organic Carbon (SOC) | Net Primary Productivity (NPP) | NPP = −7.529+0.44 × Soil Organic Carbon; R2 = 0.99\*\* (Linear) |
| Soil Organic Carbon (SOC) | Canopy volume | Canopy Volume = −0.073+0.004 × Soil Organic Carbon; R2 = 0.99\*\* (Linear) |
| Soil Moisture | Canopy volume | Canopy volume = 0.825 +−0.066 × Soil Moisture; R2 = 0.99\*\* (Linear) |
| Soil Nitrogen | Net Primary Productivity (NPP) | NPP = −61.37+1.86 × Soil Nitrogen; R2 = 0.99\*\* (Linear) |
| Soil Nitrogen | Plant Cover | Cover = −0.55 +0.028 × soil nitrogen; R2 = 0.99\* (Linear) |
| Soil Phosphorus | Plant Height | Height = 1.44 +−0.012 × Soil P; R2 = 0.99\*\* (Linear) |
| Electrical Conductivity | Plant Height | Height = 1.76 +−3.160 × Soil Ec; R2 = 0.99\*\* (Linear) |
| Soil Phosphorus | Relative Importance Value (RIV) | RIV = 19.23 +0.56 × Soil P +−0.01 soil P^2;R2 = 1.00\*\* (quadratic) |
| Electrical Conductivity | Relative Importance Value (RIV) | RIV = 1.88+286.73 × Soil Ec+−963.29 × soil Ec^2; R2 = 1.00\*\* (quadratic) |
| Soil pH | Carbon-use-efficiency | Carbon-use-efficiency = 12.38 e^ (-0.40 × soil pH;R2 = 0.99\*\* (exponential) |
| Soil pH | ration of respiration to GPP (R/GPP) | R/GPP = −1.20+0.21 × soil pH;R2 = 0.99\*\* (Linear) |