

Supplementary Table S1. Significant difference between replicates of average environmental parameters and plant measurements. Values are shown as mean \pm SD. T-tests assume unequal variances where df stands for degrees of freedom using first order Kenward and Roger correction. Avg. stands for average, veg. for vegetative, flo. for flowering, ss for statistical significance, ns for non-significant. Asterisks denote statistically significant p-value where * is for $p < 0.05$, ** is for $p < 0.01$, *** is for $p < 0.0001$.

Plant average	Replicate 1	Replicate 2	df	t Ratio	p	ss
Starting height (cm)	15.5 \pm 2.3	8.7 \pm 1.2	93.05	-4.706	<0.0001	***
Final height (cm)	76.1 \pm 7.3	70.4 \pm 5	79.35	-19.292	<0.0001	***
PPFD (umol m ² s ⁻¹)	421.1 \pm 4.1	392.4 \pm 3.0	96.3	-5.673	<0.0001	***
Fresh inflorescence (g)	116.2 \pm 25.5	104.5 \pm 28.8	104.5	-2.245	<0.05	*
Dry inflorescence (g)	23.3 \pm 5.3	19.4 \pm 5.8	105.4	-3.685	<0.0005	**
Avg. veg. growth rate (cm week ⁻¹)	7.8 \pm 1.5	7.5 \pm 1.9	100.4	-1.0159	0.3121	ns
Avg. flo. growth rate (cm week ⁻¹)	15.0 \pm 2.1	15.6 \pm 1.2	85.9	1.635	0.1057	ns
Total THC concentration(%)	7.11 \pm 1.94	9.18 \pm 1.08	26.577	3.977	<0.0005	***
Total CBD concentration(%)	4.95 \pm 1.08	5.87 \pm 0.67	28.556	3.047	<0.005	**
Total CBG concentration(%)	0.08 \pm 0.05	0.12 \pm 0.05	33.954	2.003	0.0532	ns
Total terpene concentration(mg g ⁻¹)	23.27 \pm 6.32	25.62 \pm 3.69	27.372	1.364	0.1838	ns
Total THC yield (g plant ⁻¹)	1.65 \pm 0.51	1.87 \pm 0.7	31.12528	1.087942	0.285	ns
Total CBD yield (g plant ⁻¹)	1.16 \pm 0.36	1.21 \pm 0.5	30.95745	0.338538	0.7372	ns
Total CBG yield (g plant ⁻¹)	0.02 \pm 0.01	0.02 \pm 0.01	33.35843	1.439915	0.1592	ns
Total terpene yield (mg plant ⁻¹)	476.6 \pm 169.7	595.8 \pm 215.9	32.20433	1.841671	0.0747	ns

Supplementary Table S2. Concentrations of 80 terpene compounds in *C. sativa* plants cultivated under different light treatments. Different letters represent significant difference between treatments by Tukey HSD ($p < 0.05$). "ND" stands for "not detected".

Terpene Compound (mg g ⁻¹)	HPS	Amber	Red	Rose	Purple	Blue
	7.504	4.809	5.669	7.347	8.914	7.898
Myrcene	\pm 0.43 ^{ab}	\pm 0.44 ^c	\pm 0.757 ^{bc}	\pm 0.573 ^{ab}	\pm 0.53 ^a	\pm 0.653 ^a
	5.339	4.488	4.738	5.138	5.715	5.733
α -Pinene	\pm 0.458	\pm 0.256	\pm 0.129	\pm 0.317	\pm 0.367	\pm 0.385
	2.666	1.857	2.178	2.594	3.051	2.656
Limonene	\pm 0.122 ^{ab}	\pm 0.162 ^c	\pm 0.246 ^{bc}	\pm 0.177 ^{abc}	\pm 0.119 ^a	\pm 0.23 ^{ab}
	2.474	1.929	2.03	2.3	2.708	2.687
β -Pinene	\pm 0.162 ^{ab}	\pm 0.106 ^b	\pm 0.116 ^b	\pm 0.082 ^{ab}	\pm 0.136 ^a	\pm 0.16 ^a

Terpene Compound (mg g ⁻¹)	HPS	Amber	Red	Rose	Purple	Blue
	0.717	0.428	0.467	0.59	0.847	0.845
Linalool	±0.065 ^{ab}	±0.067 ^b	±0.097 ^{ab}	±0.068 ^{ab}	±0.045 ^a	±0.02 ^a
	0.596	0.347	0.437	0.625	0.75	0.631
(E)-β-Ocimene	±0.056 ^{abc}	±0.039 ^c	±0.066 ^{bc}	±0.069 ^{ab}	±0.066 ^a	±0.053 ^{ab}
	0.402	0.298	0.298	0.373	0.458	0.46
endo-Fenchol	±0.026	±0.046	±0.052	±0.041	±0.025	±0.012
	0.396	0.233	0.275	0.371	0.413	0.377
β-Caryophyllene	±0.031	±0.028	±0.046	±0.041	±0.039	±0.076
Selina-4(15),7(11)-diene	0.363	0.217	0.26	0.323	0.414	0.466
	±0.031 ^{abc}	±0.024 ^c	±0.042 ^{bc}	±0.04 ^{abc}	±0.052 ^{ab}	±0.021 ^a
	0.487	0.284	0.336	0.43	0.556	0.614
Selina-3,7(11)-diene	±0.038 ^{ab}	±0.032 ^c	±0.053 ^{bc}	±0.053 ^{abc}	±0.058 ^a	±0.026 ^a
	0.344	0.189	0.21	0.293	0.39	0.454
Guaiol	±0.04 ^{ab}	±0.029 ^b	±0.043 ^b	±0.043 ^{ab}	±0.056 ^a	±0.031 ^a
	0.327	0.193	0.217		0.397	0.456
10-epi-γ-Eudesmol	±0.066 ^{ab}	±0.032 ^b	±0.048 ^b	0.3 ±0.05 ^{ab}	±0.064 ^{ab}	±0.027 ^a
	0.375	0.213	0.24	0.32	0.408	0.492
Bulnesol	±0.05 ^{ab}	±0.039 ^b	±0.055 ^b	±0.057 ^{ab}	±0.056 ^{ab}	±0.048 ^a
	0.292	0.208	0.211	0.266	0.324	0.329
trans-Pinene hydrate	±0.024	±0.036	±0.04	±0.032	±0.022	±0.012
	0.38	0.275	0.283	0.343	0.426	0.434
α-Terpineol	±0.032	±0.046	±0.054	±0.041	±0.03	±0.014
	0.232	0.105	0.121	0.162	0.258	0.322
Germacrene B	±0.032 ^{abc}	±0.019 ^c	±0.03 ^c	±0.028 ^{bc}	±0.04 ^{ab}	±0.032 ^a
	0.174	0.124	0.129	0.151	0.219	0.233
Citronellol	±0.014 ^{ab}	±0.022 ^b	±0.027 ^{ab}	±0.014 ^b	±0.012 ^a	±0.01 ^a

Terpene Compound (mg g ⁻¹)	HPS	Amber	Red	Rose	Purple	Blue
	0.209	0.118	0.118	0.172	0.237	0.284
α -Eudesmol	$\pm 0.027^{ab}$	$\pm 0.021^b$	$\pm 0.034^b$	$\pm 0.03^{ab}$	$\pm 0.037^{ab}$	$\pm 0.017^a$
	0.178	0.095	0.107	0.144	0.201	0.237
β -Eudesmol	$\pm 0.022^{abc}$	$\pm 0.016^c$	$\pm 0.023^{bc}$	$\pm 0.024^{abc}$	$\pm 0.03^{ab}$	$\pm 0.015^a$
	0.067	0.023	0.035	0.046	0.074	0.066
γ -Eudesmol	$\pm 0.007^a$	$\pm 0.007^b$	$\pm 0.007^{ab}$	$\pm 0.008^{ab}$	$\pm 0.009^a$	$\pm 0.01^a$
	0.069	0.093	0.109	0.116	0.117	
α -Bisabolol	0.12 ± 0.01	± 0.008	± 0.017	± 0.013	± 0.017	± 0.011
	0.136		0.106	0.121	0.148	0.147
Borneol	± 0.006	0.1 ± 0.012	± 0.015	± 0.008	± 0.004	± 0.005
	0.017	0.01	0.013	0.022	0.008	0.01
Hexanol	± 0.005	± 0.001	± 0.003	± 0.007	± 0.001	± 0.001
	0.009			0.009	0.01	
α -Thujene	$\pm 0.001^{ab}$	0.008 $\pm 0^b$	0.008 $\pm 0^b$	$\pm 0.001^{ab}$	$\pm 0.001^a$	0.01 $\pm 0^a$
						0.007
α -Fenchene	0.006 ± 0	0.006 ± 0	0.006 ± 0	0.006 ± 0	0.006 ± 0	± 0.001
	0.152	0.09	0.103	0.142	0.16	0.17
α -Humulene	$\pm 0.013^{abc}$	$\pm 0.011^c$	$\pm 0.019^{bc}$	$\pm 0.017^{abc}$	$\pm 0.017^a$	$\pm 0.01^{ab}$
	0.15	0.126	0.129	0.147	0.166	0.162
Camphene	$\pm 0.008^{ab}$	$\pm 0.007^b$	$\pm 0.007^b$	$\pm 0.004^{ab}$	$\pm 0.005^a$	$\pm 0.011^a$
	0.092	0.041	0.046	0.062	0.1	0.129
γ -Elemene	$\pm 0.009^{bc}$	$\pm 0.006^d$	$\pm 0.01^d$	$\pm 0.006^{cd}$	$\pm 0.009^{ab}$	$\pm 0.006^a$
	0.011	0.011	0.02	0.024	0.012	0.017
Sabinene	± 0.003	± 0.001	± 0.005	± 0.006	± 0.004	± 0.002
	0.011	0.011	0.009	0.015	0.013	0.015
α -Phellandrene	± 0.001	± 0.002	± 0.001	± 0.002	± 0.002	± 0.001

Terpene Compound (mg g ⁻¹)	HPS	Amber	Red	Rose	Purple	Blue
	0.075	0.073	0.079	0.097	0.106	0.105
β-Phellandrene	±0.016	±0.007	±0.006	±0.009	±0.019	±0.015
	0.053	0.014	0.051	0.021	0.088	0.088
1,8-Cineole	±0.022	±0.003	±0.016	±0.002	±0.032	±0.025
	0.014	0.01	0.011	0.013	0.017	0.015
(Z)-β-Ocimene	±0.001 ^{ab}	±0.001 ^b	±0.001 ^{ab}	±0.001 ^{ab}	±0.001 ^a	±0.002 ^{ab}
	0.013	0.01	0.011		0.015	0.014
γ-Terpinene	±0.001 ^{ab}	±0.001 ^c	±0.001 ^{bc}	0.013 ±0 ^{ab}	±0.001 ^a	±0.001 ^{ab}
	0.033	0.026	0.026	0.03	0.032	0.033
cis-Sabinene hydrate	±0.004	±0.006	±0.005	±0.002	±0.005	±0.007
	0.066	0.054	0.055	0.064	0.074	0.067
Fenchone	±0.004	±0.006	±0.008	±0.005	±0.003	±0.002
	0.039	0.031	0.035	0.04	0.046	0.037
Terpinolene	±0.003 ^{ab}	±0.003 ^b	±0.004 ^{ab}	±0.002 ^{ab}	±0.002 ^a	±0.004 ^{ab}
trans-Sabinene hydrate	0.01	0.009	0.01	0.01	0.012	0.012
	±0.001	±0.001	±0.001	±0.001	±0.001	±0.001
	0.07	0.049	0.055	0.063	0.076	0.077
cis-Pinene hydrate	±0.006	±0.008	±0.009	±0.007	±0.005	±0.004
	0.027	0.02	0.023	0.025	0.03	0.033
Camphene hydrate	±0.002	±0.002	±0.003	±0.002	±0.002	±0.008
	0.039	0.035	0.04	0.032	0.04	0.035
Ipsdienol	±0.002	±0.001	±0.004	±0.006	±0.001	±0.002
	0.015	0.013	0.014	0.016	0.021	0.021
Terpinen-4-ol	±0.001 ^b	±0.001 ^b	±0.002 ^b	±0.001 ^{ab}	±0.003 ^{ab}	±0.001 ^a
	0.015	0.012	0.012	0.014	0.018	0.015
Geraniol	±0.002	±0.002	±0.002	±0.001	±0.001	±0.001

Terpene Compound (mg g ⁻¹)	HPS	Amber	Red	Rose	Purple	Blue
			0.008	0.008	0.009	0.01
α -Cubebene	0.008 ±0	0.007 ±0	±0.001	±0.001	±0.001	±0.001
	0.008		0.006	0.009	0.009	
α -Ylangene	±0.001	0.006 ±0	±0.001	±0.001	±0.001	0.009 ±0
	0.06	0.058	0.062	0.038	0.045	0.054
Hexyl hexanoate	±0.008	±0.005	±0.011	±0.009	±0.003	±0.003
	0.053	0.022	0.028	0.03	0.034	0.026
trans- α -Bergamotene	±0.013	±0.002	±0.004	±0.002	±0.005	±0.004
	0.006		0.006			0.005
allo-Aromadendrene	±0.001	0.005 ±0	±0.001	0.006 ±0	0.006 ±0	±0.001
	0.017	0.011	0.013	0.015	0.017	0.014
(E)- β -Farnesene	±0.002	±0.001	±0.002	±0.002	±0.003	±0.003
	0.078	0.044	0.06	0.046	0.083	0.093
β -Selinene	±0.005 ^a	±0.003 ^b	±0.007 ^{ab}	±0.012 ^{ab}	±0.009 ^a	±0.006 ^a
	0.068	0.056	0.057	0.07	0.096	0.066
α -Selinene	±0.005	±0.01	±0.008	±0.005	±0.016	±0.022
	0.014	0.012	0.016	0.014	0.014	0.018
β -Bisabolene	±0.002	±0.002	±0.003	±0.002	±0.004	±0.003
	0.078	0.048	0.052	0.055	0.083	0.116
(3E,6E)- α -Farnesene	±0.013 ^{ab}	±0.007 ^b	±0.01 ^{ab}	±0.017 ^{ab}	±0.02 ^{ab}	±0.02 ^a
Spirovetiva-	0.054	0.037	0.034	0.048	0.045	0.065
1(10),7(11)-diene	±0.007	±0.005	±0.008	±0.011	±0.004	±0.009
	0.087	0.057	0.076	0.082	0.085	0.08
(E)- α -Bisabolene	±0.005 ^a	±0.004 ^b	±0.01 ^{ab}	±0.006 ^{ab}	±0.008 ^{ab}	±0.005 ^{ab}
Eudesma-5,7(11)-	0.039	0.028	0.03	0.037	0.045	0.045
diene	±0.003 ^{ab}	±0.002 ^b	±0.003 ^b	±0.003 ^{ab}	±0.005 ^a	±0.002 ^a

Terpene Compound (mg g ⁻¹)	HPS	Amber	Red	Rose	Purple	Blue
	0.058	0.041	0.045	0.055	0.066	0.072
(E)-Nerolidol	±0.006 ^{ab}	±0.004 ^b	±0.006 ^{ab}	±0.006 ^{ab}	±0.008 ^{ab}	±0.006 ^a
	0.021	0.019	0.013	0.045	0.07	0.087
Caryophyllene oxide	±0.003	±0.008	±0.004	±0.017	±0.027	±0.027
	0.041	0.02	0.022	0.031	0.047	0.045
Humulene epoxide II	±0.005 ^{ab}	±0.002 ^c	±0.005 ^{bc}	±0.005 ^{abc}	±0.007 ^a	±0.003 ^a
	0.044	0.025	0.031	0.038	0.049	0.056
Juniper camphor	±0.005 ^{abc}	±0.003 ^c	±0.006 ^{bc}	±0.005 ^{abc}	±0.007 ^{ab}	±0.003 ^a
Aromadendrane-4,10-diol	0.018	0.013	0.021	0.02	0.021	0.017
	±0.002	±0.002	±0.002	±0.002	±0.002	±0.003
	0.021	0.013	0.013	0.017	0.024	0.025
meta-Camphorene	±0.003 ^{ab}	±0.002 ^b	±0.003 ^{ab}	±0.003 ^{ab}	±0.003 ^{ab}	±0.001 ^a
	0.127	0.138	0.193	0.18	0.259	0.185
Phytol	±0.017	±0.029	±0.031	±0.035	±0.061	±0.031
	0.018		0.019	0.024	0.029	0.026
δ-Guaiene	±0.002	0.034 ±0	±0.003	±0.005	±0.006	±0.002
Eremophilal-1(10),7(11)-diene	0.041	0.035	0.03	0.046	0.053	0.058
	±0.003	±0.002	±0.005	±0.005	±0.008	±0.012
	0.028	0.007	0.036	0.035	0.031	0.039
Cryptomeridiol	±0.009	±0.001	±0.003	±0.005	±0.012	±0.009
	0.006	0.005		0.007	0.006	0.006
para-Cymene	±0.001	±0.001	0.006 ±0	±0.001	±0.001	±0.001
	0.007	0.009	0.007	0.009	0.008	0.007
α-Terpinene	±0.001	±0.002	±0.001	±0.002	±0.002	±0.001
	0.018		0.014	0.017	0.034	0.097
Valencene	±0.003	ND	±0.002	±0.006	±0.014	±0.002

Terpene Compound (mg g ⁻¹)	HPS	Amber	Red	Rose	Purple	Blue
	0.012	0.007	0.012		0.01	0.082
α -Santalene	± 0.002	± 0.003	± 0.001	0.014 ± 0	± 0.003	± 0.062
	0.016	0.013		0.023	0.019	0.019
(4Z)-Decenol	± 0.003	± 0.002	ND	± 0.001	± 0.001	± 0.001
	0.019	0.005	0.01	0.011	0.011	0.014
Selin-6-en-4 α -ol	± 0.006	± 0.001	± 0.002	± 0.001	± 0.002	± 0.002
	0.003		0.016		0.018	0.019
α -Guaiene	± 0.001	0.002 ± 0	± 0.002	ND	± 0.008	± 0.006
	0.002	0.002			0.006	
Hashishene	± 0.001	± 0.001	0.003 ± 0	ND	± 0.001	0.004 ± 0
	0.005				0.004	
Decanol	$\pm 0.001^{ab}$	0.004 ± 0^b	0.007 ± 0^a	ND	$\pm 0.001^b$	0.003 ± 0^b
						0.007
Epoxyterpinolene	ND	ND	ND	ND	ND	± 0.001
						0.003
$\Delta 3$ -Carene	0.004 ± 0	ND	0.003 ± 0	0.004 ± 0	ND	± 0.001
	0.006				0.004	
para-Cymenene	± 0.001	ND	ND	ND	± 0.001	0.001 ± 0
Selin-6-en-4 α -ol						0.043
isomer	ND	ND	ND	ND	ND	± 0.004
Caryophylla-3,8(13)-dien-5 β -ol	0.017		0.012	0.01	0.012	0.018
	± 0.003	0.004 ± 0	± 0.002	± 0.001	± 0.002	± 0.007
	0.041	0.022	0.047		0.024	
(2E,6E)-Farnesol	$\pm 0.006^{ab}$	$\pm 0.007^{ab}$	$\pm 0.004^{ab}$	0.015 ± 0^b	$\pm 0.001^{ab}$	0.045 ± 0^a
						0.004
Hexyl butyrate	ND	ND	ND	ND	ND	± 0.001
para-Cymen-8-ol	ND	ND	0.003 ± 0	ND	ND	ND