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Moisture content estimation and senescence phenotyping of novel Miscanthus hybrids combining UAV-based remote sensing and machine learning

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Figure S1: Temporal dynamic of the measured moisture content of different *Miscanthus* genotypes along two growing seasons and two locations.

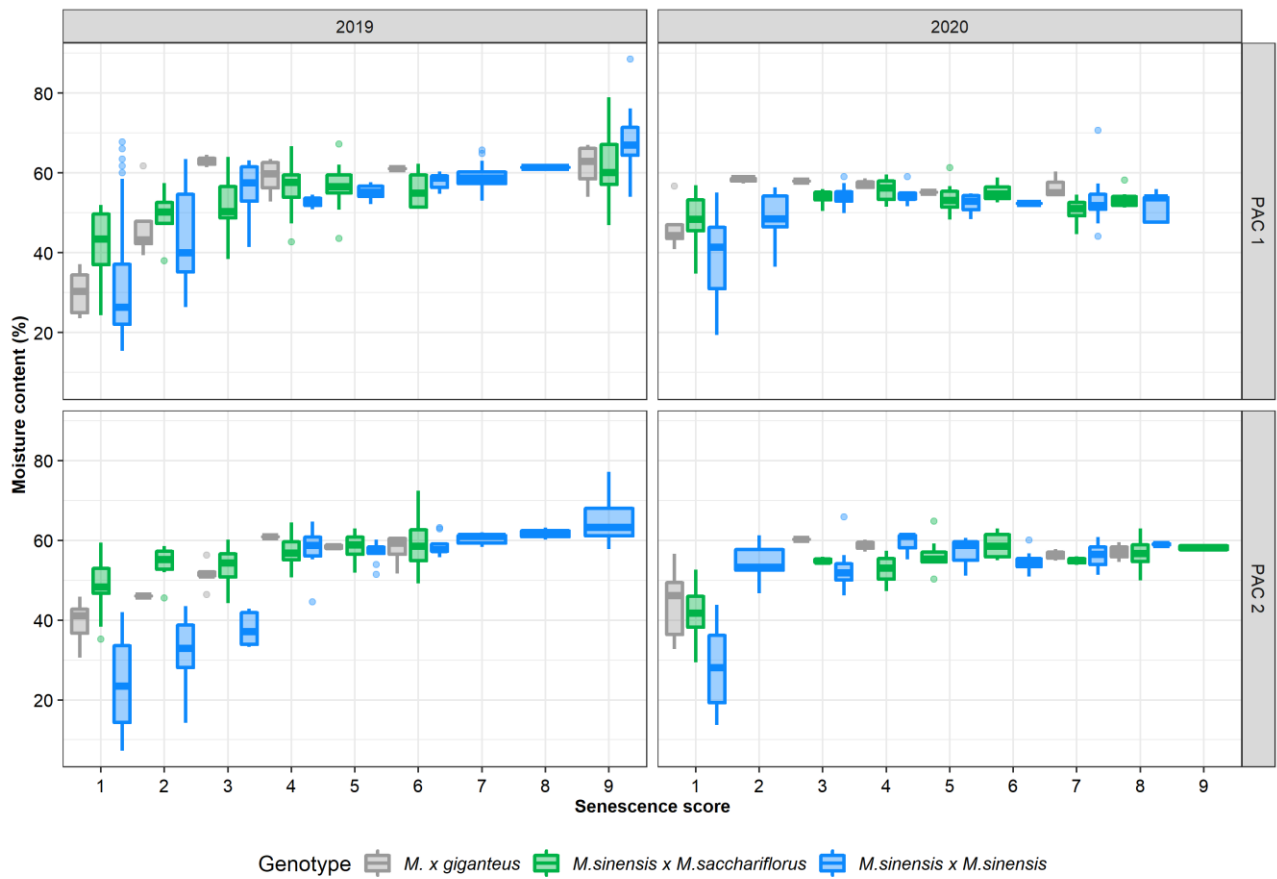


Figure S1: Relation between senescence score and moisture content of different *Miscanthus* genotypes.

Table S1: Unmanned Aerial Vehicle (UAV) flights performed in the two locations along two senescence seasons.

Location	Season	UAV flights days
PAC 1	2019	05/08/2019, 10/09/2019, 27/09/2019, 11/10/2019, 26/10/2019, 09/11/2019, 20/11/2019, 03/12/2019, 10/01/2020, 21/02/2020
	2020	01/09/2020, 17/09/2020, 28/09/2020, 10/10/2020, 28/10/2020, 06/11/2020, 19/11/2020, 15/12/2020, 26/01/2021, 01/02/2021
PAC 2	2019	12/09/2019, 12/10/2019, 09/11/2019, 10/12/2019, 10/01/2020, 14/02/2020
	2020	16/09/2020, 29/09/2020, 10/10/2020, 28/10/2020, 06/11/2020, 23/11/2020, 13/12/2020, 19/02/2021

Table S2: List of the vegetation indices evaluated in random forest models for the estimation of *Miscanthus* moisture content.

VIs	Equation	Reference	VIs	Equation	Reference
BNDVI	$(\text{NIR}-\text{Blue})/(\text{NIR}+\text{Blue})$	Wang <i>et al.</i> , 2007	MTVI1	$1.2*(1.2*(\text{NIR}-\text{Green})-2.5*(\text{Red}-\text{Green}))$	Haboudane <i>et al.</i> , 2004
Chlrededge	$\text{RedEdge}/\text{Red} - 1$	Gitelson <i>et al.</i> , 2006	MTVI2	$1.5*((1.2*(\text{NIR}-\text{Green})-2.5*(\text{Red}-\text{Green}))/(\text{sqrt}((2*\text{NIR}+1)^2-(6*\text{NIR}-5*\text{sqrt}(\text{Red}-0.5))))$	Haboudane <i>et al.</i> , 2004
CIgreen	$\text{NIR}/\text{Green}-1$	Gitelson <i>et al.</i> , 2003	NDRE	$(\text{NIR}-\text{RedEdge})/(\text{NIR}+\text{RedEdge})$	Gitelson <i>et al.</i> , 1994
CIre	$\text{NIR}/\text{RedEdge}-1$	Gitelson <i>et al.</i> , 2003	NDVI	$(\text{NIR}-\text{Red})/(\text{NIR}+\text{Red})$	Rouse <i>et al.</i> , 1974
Datt1	$(\text{NIR}-\text{RedEdge})/(\text{NIR}+\text{Red})$	Datt, 1999	NGBDI	$(\text{Green}-\text{Red})/(\text{Green}+\text{Blue})$	Wang <i>et al.</i> , 2007
Datt2	$\text{NIR}/\text{RedEdge}$	Datt, 1999	NGRDI	$(\text{Green}-\text{Red})/(\text{Green}+\text{Red})$	Tucker, 1979
DVI	$\text{NIR} - \text{Red}$	Richardson & Weigand, 1977	NLI	$(\text{NIR}^2-\text{Red})/(\text{NIR}^2+\text{Red})$	Chen, 1996
EVI	$2.5*((\text{NIR}-\text{Red})/(1+\text{NIR}+6*\text{Red}-7.5*\text{Blue}))$	Huete <i>et al.</i> , 2002	OSAVI	$(1+0.16)*(\text{NIR}-\text{Red})/(\text{NIR}+\text{Red}+0.16)$	Rondeaux <i>et al.</i> , 1996
EVI2	$2.4*((\text{NIR}-\text{Red})/(1+\text{NIR}+\text{Red}))$	Miura <i>et al.</i> , 2008	OSAVI2	$(1+0.16)*(\text{NIR}-\text{RedEdge})/(\text{NIR}+\text{RedEdge}+0.16)$	Wu <i>et al.</i> , 2008
EVI3	$2.5*((\text{NIR}-\text{Red})/(\text{NIR}+2.4*\text{Red}+1))$	Jiang <i>et al.</i> , 2008	PNDVI	$(\text{NIR}-(\text{Blue}+\text{Green}+\text{Red}))/(\text{NIR}+(\text{Blue}+\text{Green}+\text{Red}))$	Wang <i>et al.</i> , 2007
GARI	$(\text{NIR}-(\text{Green}-(\text{Blue}-\text{Red}))) / (\text{NIR}-(\text{Green}+(\text{Blue}-\text{Red})))$	Gitelson <i>et al.</i> , 1996	PSRI	$(\text{Red}-\text{Blue})/\text{RedEdge}$	Merzlyak <i>et al.</i> , 1999
GBNDVI	$(\text{NIR}-(\text{Green}+\text{Blue})) / (\text{NIR}+(\text{Green}+\text{Blue}))$	Wang <i>et al.</i> , 2007	RBNDVI	$(\text{NIR}-(\text{Red}+\text{Blue})) / (\text{NIR}+(\text{Red}+\text{Blue}))$	Wang <i>et al.</i> , 2007
GDVI	$\text{NIR}-\text{Green}$	Tucker, 1979	RDVI	$(\text{NIR}-\text{Red})/((\text{NIR}+\text{Red})^{0.5})$	Brogea & Leblancb, 2000
GI	Green/Red	Smith <i>et al.</i> , 1995	rededgeWDRVI	$(0.1*\text{NIR}-\text{RedEdge})/((0.1*\text{NIR}+\text{RedEdge})+(1-0.1)/(1+0.1))$	Gitelson, 2004
GLI	$(2*\text{Green}-\text{Red}-\text{Blue})/(2*\text{Green}+\text{Red}+\text{Blue})$	Widlowski <i>et al.</i> , 2000	RI	$(\text{Red}-\text{Green})/(\text{Red}+\text{Green})$	Escadafal & Huete 1991
GNDVI	$(\text{NIR}-\text{Green})/(\text{NIR}+\text{Green})$	Gitelson <i>et al.</i> , 1996	SAVI	$((\text{NIR}-\text{Red})/(\text{NIR}+\text{Red}+0.5))*(1+0.5)$	Huete <i>et al.</i> , 1988
GOSAVI	$(\text{NIR}-\text{Green})/(\text{NIR}+\text{Green}+0.16)$	Sripada <i>et al.</i> , 2006	SIPI	$(\text{NIR} - \text{Blue}) / (\text{NIR} - \text{Red})$	Peñuelas <i>et al.</i> , 1995
greenWDRVI	$(0.1*\text{NIR}-\text{Green})/((0.1*\text{NIR}+\text{Green})+(1-0.1)/(1+0.1))$	Gitelson, 2004	SR	NIR/Red	Birth & McVey, 1968
GRNDVI	$(\text{NIR}-(\text{Green}+\text{Red})) / (\text{NIR}+(\text{Green}+\text{Red}))$	Wang <i>et al.</i> , 2007	TCI	$1.2*(\text{RedEdge}-\text{Green})-1.5*(\text{Red}-\text{Green})*\text{sqrt}(\text{RedEdge}/\text{Red})$	Hunt <i>et al.</i> , 2011
GRVI	NIR/Green	Tucker, 1979	TNDVI	$\text{sqrt}(0.5 + (\text{NIR}-\text{Red})/(\text{NIR}+\text{Red}))$	Bannari <i>et al.</i> , 2002
IPVI	$((\text{NIR}/(\text{NIR}+\text{Red}))/2)*((\text{NIR}-\text{Red})/(\text{NIR}+\text{Red}+1))$	Crippen, 1990	TRBI	$(\text{Green}+\text{Red})/\text{NIR}$	Vincini <i>et al.</i> , 2007
MCARI	$((\text{RedEdge}-\text{Red})-0.2*(\text{RedEdge}-\text{Green}))*(\text{RedEdge}/\text{Red})$	Daughtry <i>et al.</i> , 2000	VARIgreen	$(\text{Green}-\text{Red})/(\text{Green}+\text{Red}-\text{Blue})$	Gitelson <i>et al.</i> , 2002
MCARI/MTVI2	MCARI/MTVI2	Eitel <i>et al.</i> , 2007	VARIrededge	$(\text{RedEdge}-\text{Red})/(\text{RedEdge}+\text{Red})$	Gitelson <i>et al.</i> , 2002
MCARI/OSAVI	MCARI/OSAVI	Wu <i>et al.</i> , 2008	WDRVI	$(0.1*\text{NIR}-\text{Red})/((0.1*\text{NIR}+\text{Red})+(1-0.1)/(1+0.1))$	Gitelson, 2004
MCARI/OSAVI2	MCARI/OSAVI2	Wu <i>et al.</i> , 2008	WDRVI2	$(0.2*\text{NIR}-\text{Red})/((0.2*\text{NIR}+\text{Red})+(1-0.2)/(1+0.2))$	
MCARI2	$((\text{NIR}-\text{RedEdge})-0.2*(\text{NIR}-\text{Green}))*(\text{NIR}/\text{RedEdge})$	Wu <i>et al.</i> , 2008	WDRVI3	$(0.1*\text{NIR}-\text{Red})/((0.1*\text{NIR}+\text{Red}))$	
MSAVI	$((2*\text{NIR}+1-\text{sqrt}((2*\text{NIR}+1)**2-(8*(\text{NIR}-\text{Red}))))/2)$	Qi <i>et al.</i> , 1994	WDRVI4	$((0.1*\text{NIR}-\text{Red})/((0.1*\text{NIR}+\text{Red}))+1)/2$	

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