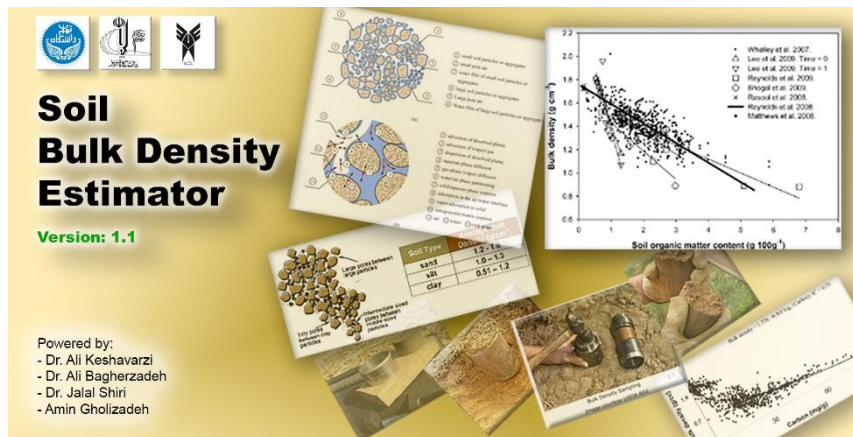


## Soil Bulk Density Estimator (BD-App)



### Description

The algorithms of software for estimating the BD is based on the equations shown below. The program has been written in Delphi Programming language. The parameters are given in an Ms-Excel format file to BD-App estimator. The results can also be demonstrated in Ms-Excel format. The software has the ability to demonstrate regression equations between the influencing factors and the BD derived by each equation. The software has been designed quite user friendly and conducts the user correctly through the calculations step by step and don't allow the user to make a mistake. It is compatible with 32 and 64-bit windows operating system types.

The table of equations and the screenshots of the software calculations has been shown below:

Input Parameters	Output
OC (%)	BD (gr/cm <sup>3</sup> )
Clay (%)	
CCE (%)	
pH <sub>extract</sub>	

References	Equations
Wu et al. (2003) for (OC < 6%)	$BD = (-0.1229) \times \ln(OC) + 1.2901$
Wu et al. (2003) for (OC > 6%)	$BD = 1.3774 \times \exp(-0.0413 \times OC)$
Song et al. (2005) for (un-cropland)	$BD = 1.3565 \times \exp(-0.046 \times OC)$
Song et al. (2005) for (cropland)	$BD = 1.377 \times \exp(-0.048 \times OC)$
Yang et al. (2007)	$BD = 0.29 + 1.2033 \times \exp(-0.0775 \times OM)$
Barros and Fearnside (2015)	$BD = (1.419) - (0.0037 \times Clay) - (0.061 \times OC)$
Shiri et al. (2017) for pasture and irrigated farming	$BD = (1.5606) - (0.2326 \times OC)$
Shiri et al. (2017) for pasture and irrigated farming	$BD = -0.2470 \times C \times \arctan\left(\frac{clay}{CCE + 7.02216}\right) + \frac{OC \times \arctan(pH)}{CCE + 10.505} + 1.53433$
Manrique and Jones (1991)	$BD = a + b \times \log_{10} OM$
Manrique and Jones (1991)	$BD = a + b \times \sqrt{OC}$

Adams (1973)	$BD = \frac{100}{\left\{ \left( \frac{OM}{a} \right) + \left[ \frac{100 - OM}{b} \right] \right\}}$
Federer (1983)	

Soil App.: " D:\OTHERS\Dr.Keshavarz\Soil\_App\DATA.xlsx "

File Run Help

Load from Excel

Sample ID	Clay [%]	CCE [%]	OC [%]	OM [%]	pH [extract]	BD [g/cm3]	BD: Wu et al (2003) for [OC<6%]	BD: Wu et al (2003) for [OC<=6%]	BD: Yang et al (2007)	BD: Shai et al (2017) [1]
1	33.44	12.43	0.94	1.62056	7.84	1.306	1.209	0.000	1.351	1.342
2	30.72	12.36	0.61	1.05164	7.89	1.433	1.232	0.000	1.399	1.419
3	42.28	13.07	0.38	0.65512	8.14	1.481	1.251	0.000	1.434	1.472
4	46.72	11.07	0.51	0.87324	8.16	1.453	1.239	0.000	1.414	1.442
5	53.44	18.21	0.95	1.6378	7.93	1.206	1.208	0.000	1.350	1.340
6	50.72	15.43	0.72	1.24128	8.17	1.29	1.223	0.000	1.383	1.393
7	55.44	13.21	0.54	0.93096	7.81	1.329	1.237	0.000	1.410	1.435
8	18.72	19.29	0.28	0.48272	8.02	1.501	1.260	0.000	1.449	1.495
9	43.44	8.35	0.86	1.48264	7.95	1.354	1.214	0.000	1.363	1.361
10	49.44	10.66	0.8	1.3792	7.96	1.396	1.218	0.000	1.371	1.375

Wu et al. (2003) for [OC < 6%]  
 Wu et al. (2003) for [OC >= 6%]  
 Song et al. (2005) for [un-cropland]  
 Song et al. (2005) for [cropland]  
 Yang et al. (2007)  
 Baroo and Feamside (2015)  
 Shai et al. (2017) [1]  
 Shai et al. (2017) [2]

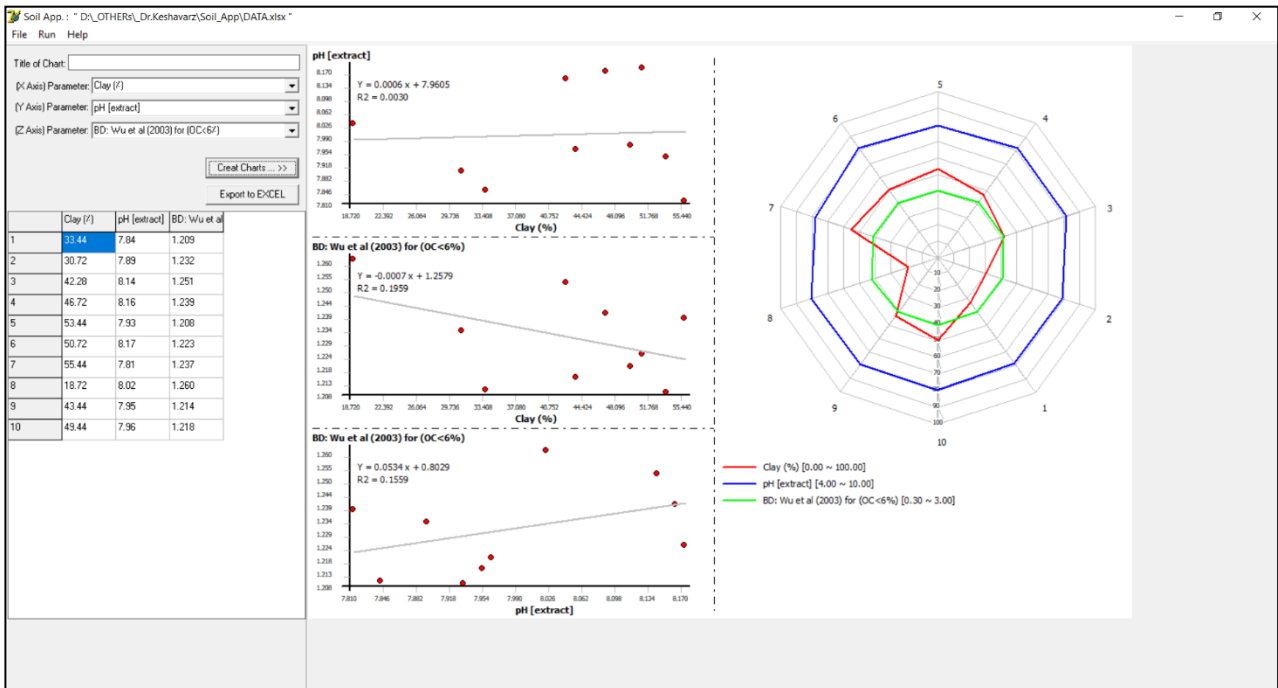
Jeffrey (1970)    a    b    c  
 Manrique and Jones (1991)  
 Adams (1973)  
 Federer (1983)

Calculate... >>

Graph...

Export to Excel...

EXIT



## References

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