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The contrasting influence of clay mineralogy, rates of application and clay tensile strength on the amelioration of hydrophobicity and crusting of a non-wetting sandy soil.

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Claying of sandy soils is a common practice in Western Australia to overcome the non-wetting characteristics of these water repellent soils. The commonly recommended rate of application is to increase the clay content of these soils from $<$1% to about 3%, which generally reduces the hydrophobicity to a manageable level. However above these rates of clay additions, soil strength can be affected by the additions of these clays. It was the aim of this work to look at clays of differing mineralogy, strength characteristics and application rates on their affect on the overall soil strength and amelioration of the clayed soils.

A water repellent sandy soil from Woogenellup was mixed with four different clays from rates of 0 to 50% w/w and tested for water repellency (MED and WDPT) and strength of dry soil pellets with a Dillon recording penetrometer.

The sub-soil clays used in this experiment varied in clay content, electrical conductivity and mineralogy. The range of clay content was from 28-59%, mineralogy was mainly quartz (30-70%) and kaolinite (5-35%). One sample had 65% smectite, another 25% illite. Electrical conductivities (mS/m) varied from 4.7 to 105.9.

The addition of the clays at 1% was enough to reduce the water repellency and above 3% all hydrophobicity was ameliorated. Pellet strength was significantly increased by any additions of the sub-soil clays and were above the range of the penetrometer from 5% for the strongest clay to $>$10% for the weakest. The critical penetration resistance of 3Mpa was exceeded at 2.5% for the smectitic clay and 9% for the weakest kaolinitic

clay. Salt content of the clays had the same influence and therefore was confounding the mineralogy influence.

It is suggested that depending on the clay characteristics, surface crusting may be a significant problem if the clay content of the water repellent sand is increased above 2.5% for the addition of hard clays and 9% for the softer clays.