



# Moisture loss resistivity against evaporation (water retention capacity) of natural soil amended with raw and apatite synthesized fly ash

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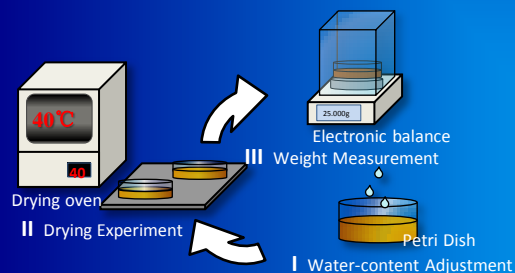
## Background

- Thermal power generation is popular all over the world and large amount of coal fly ash (FA) are discharged (Problem ①: How to utilize FA efficiently?)
- Desertification has threatened arid area like western China. (Problem ②: Efficient soil water holding agent)

### POINT

Utilize FA as the soil water holding agent

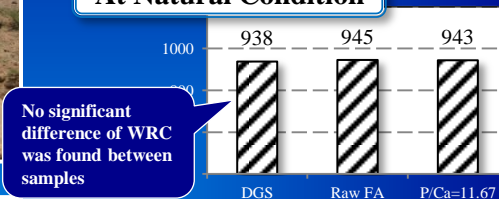
## Materials & Methods



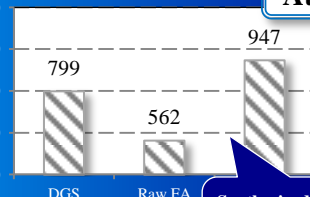
## Results & Discussion

WRC of pure FA/apatite synthesized FA

### At Natural Condition

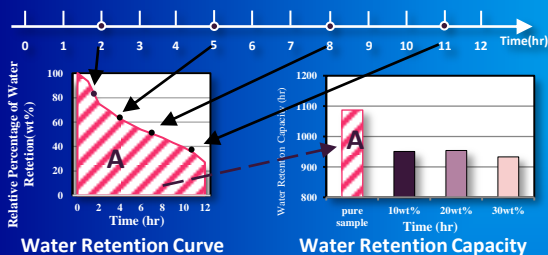


### At 40 °C

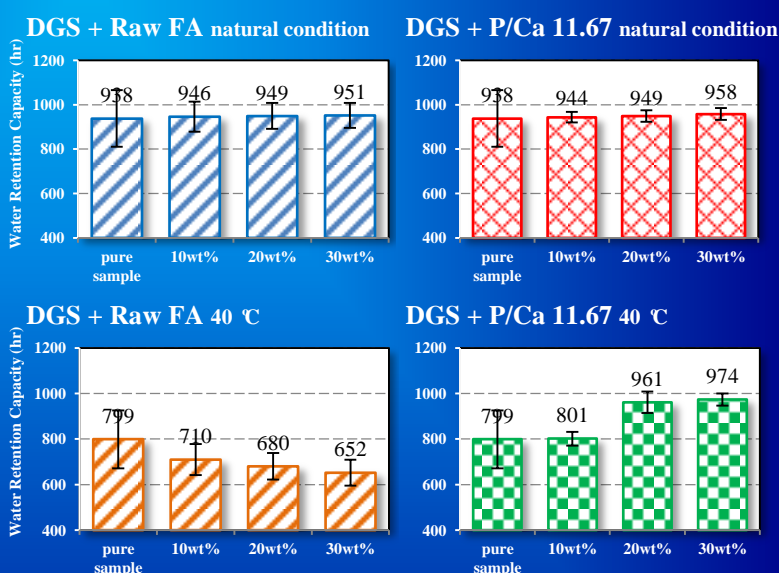


Synthesized FA with P/Ca ratio 11 showed obviously high WRC

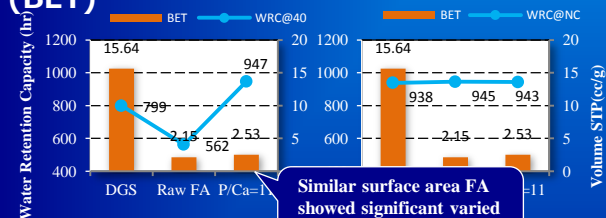
## Water Retention Capacity (WRC)



## WRC of DGS amended by raw/synthesized FA



## Specific Surface Area (BET)



## Conclusion

- Raw FA gave negative effect on adjusting WRC of soil regardless of mixing ratio;
- Apatite synthesized FA with P/Ca ratio of 11.67 gave positive effect on increasing WRC of DGS;
- Effect of FA amendment on soil WRC depends on temperature, FA mixing ratio, and surface treatment type interactively;
- No clear correlation between pore type, surface area and WRC were found at present;

## Summary Table

| Fly Ash                               | WHC of FA (40 °C) | Room Temperature | 40 °C | Surface area (cc/g) | Pore Type |
|---------------------------------------|-------------------|------------------|-------|---------------------|-----------|
|                                       |                   | DGS              | DGS   |                     |           |
| Raw FA                                | 476               | 942              | 18.4% | 2.15                | Silt      |
| Apatite synthesized FA with P/Ca = 11 | 947               | 943              | 21.9% | 2.53                | Silt      |