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Concept of Using Biomass Boards for Greening Deserts

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Thinned logs

→ Low quality, small diameter



Sawdust and Woodchip
from the sites of lumbering

- Decline in natural resource
- Global warming
- Desertification

Utilization of unused resource

URGENT

Fabrication of Biomass boards with high-pressure steam

Biomass board is...



Eco-Friendly
→ Biodegradable
Easy to recycle

Compressively molding with high-pressure steam method

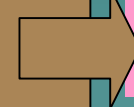
Softening at 120°C



Compression to the targeted density



Shape fixation at 180°C



Fixation of entanglement between particles causes the adhesion

- Increase in cellulose crystallinity
- Transformation of cellulosic crystalline structure

→ Applied to shape-memory treatment of fabric materials





+



TiO₂

From Sawdust



Photocatalytic board



From Cotton



From Paper



Physical strength of board (Red lauan)

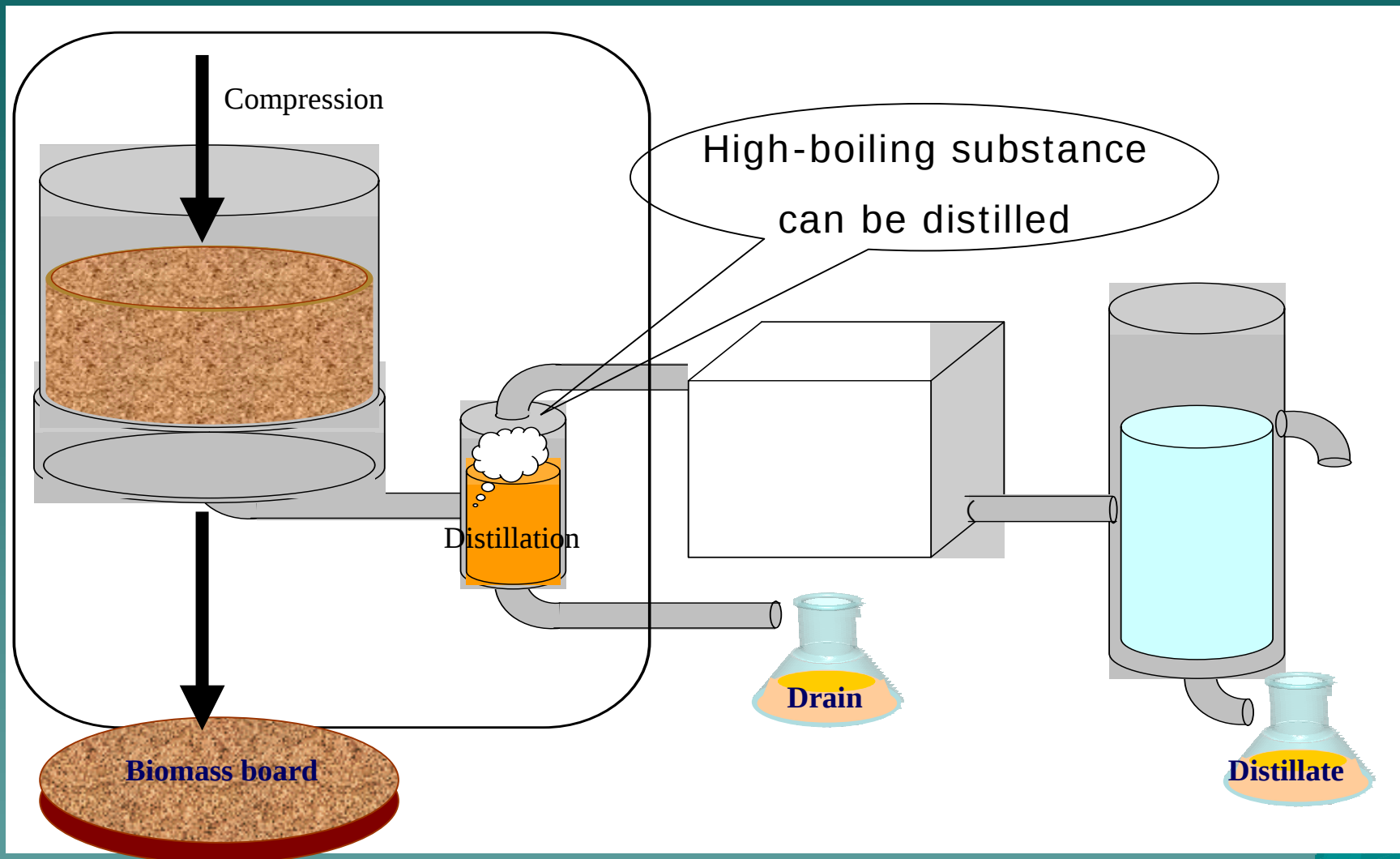
Material	IB(MPa)	MOR(MPa)
Sawdust	0.980	11.5
Wood-fiber	1.28	40.8
JIS Standard (MDF Type5)	≥ 0.2	≥ 5.0

Boards with certain strength



Construction material
Interior material

Furthermore...



TOTAL UTILIZATION OF WOOD RESIDUE is possible
with using high-pressure steam distillation method

Desertification and Soil Erosion

Deforestation and Heavy grazing



Vegetation removal

- Lack of nutrient
- Lack of water
- Soil erosion



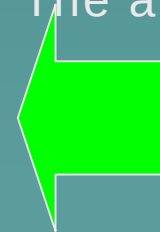
Desertification



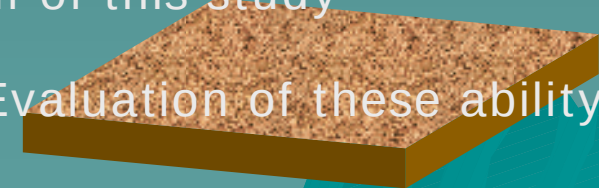
As mulching material

- Soil moisture control
- Soil temperature control
- Erosion control
- Fertilizer supply

The aim of this study



Evaluation of these ability

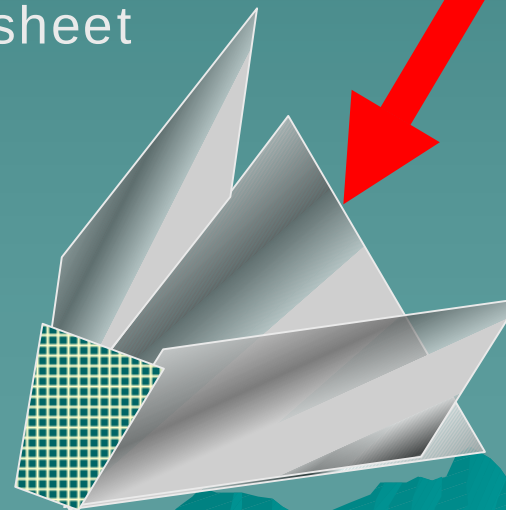


Runoff Test

- Bare grounds were prepared by removing weeds
- Steep slope(30°) and gentle slope (5°) was prepared
- Funnel-shaped stainless plates were placed at the bottom edges of the slopes

15 areas of $120\text{cm} \times 30\text{cm}$ were made with using corrugated plastic sheet

TOTAL: 30areas (15 in SS, 15 in GS)



Full-board area(FB)	4 pieces of Biomass boards (29cm × 29cm × 2cm) were placed to cover the whole surface
Half-board area(HB)	2 pieces of biomass boards were placed on the top and bottom edges of the slopes
Rice straw area(RS)	Rice straw was placed at 2-cm thick layer
Woodchip area(WC)	Woodchip (raw material of biomass boards) was placed at 2-cm thick layer
Bare ground area(BA)	No mulching

Biomass Boards

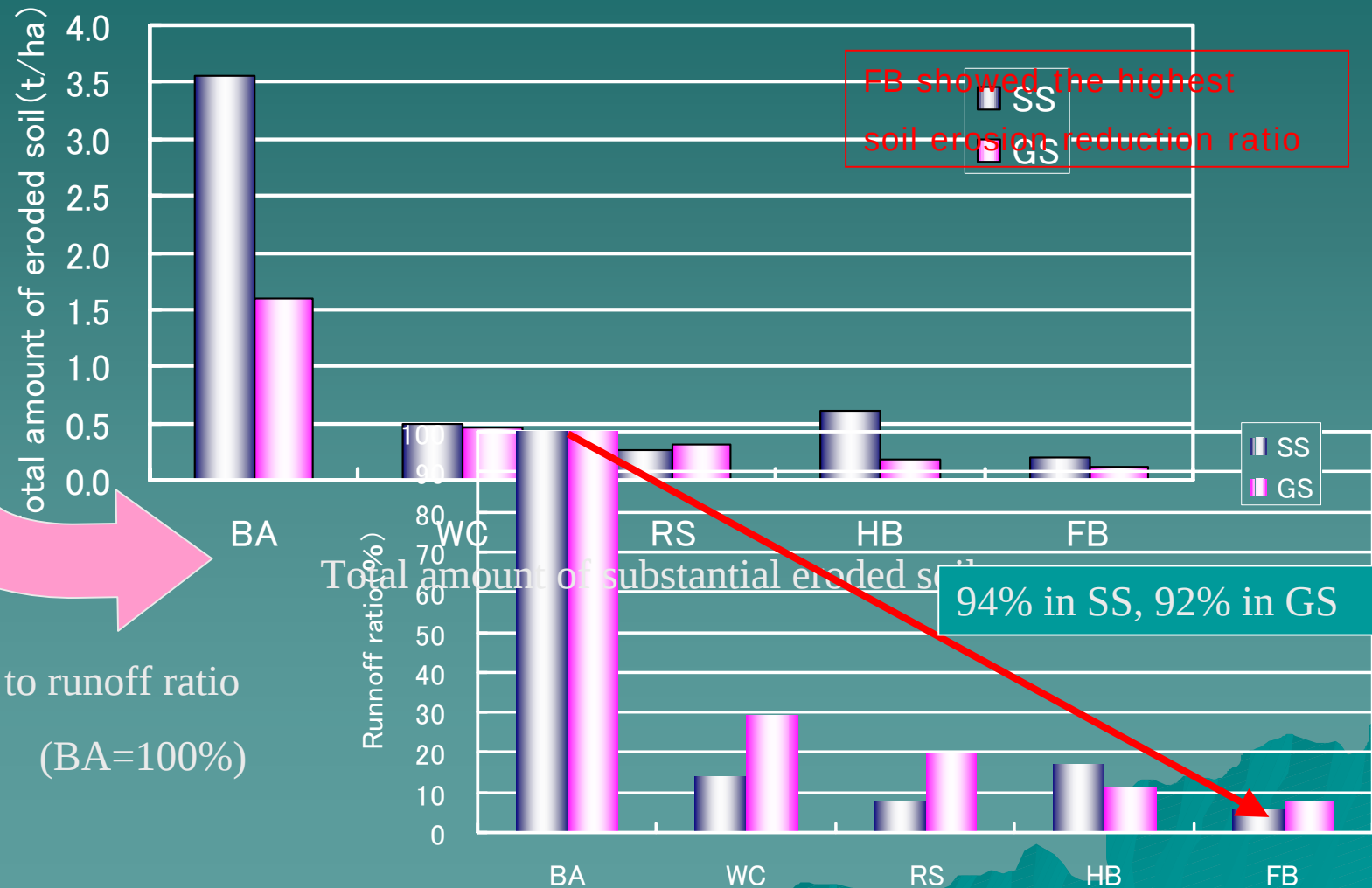
Obtained from Kaminoho Forest Cooperative



For mulching material and paving material

Period: Oct. 2006- Jan. 2007

Total rainfall : 254mm



Converting to runoff ratio
(BA=100%)

Moisture Control Ability Test

400g of river sand was filled into plastic pot

— Biomass board

— Rice straw

— Woodchip

— additional sand

— Blank

Placed to obtain same
thickness as biomass
board (2cm)



200g of water was dropped using peristaltic pump



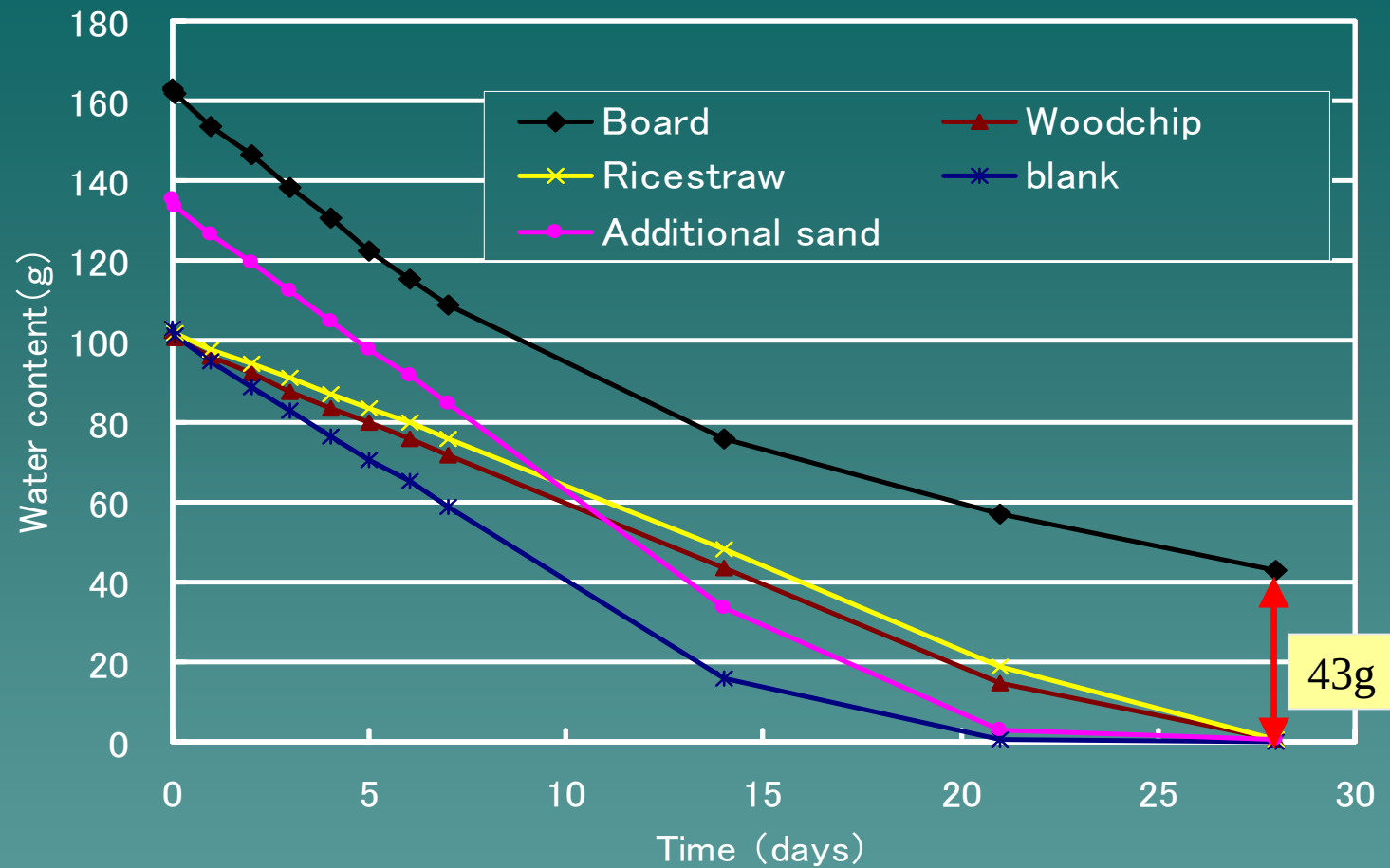
← Placed in a temperature controlled room (25°C)

Moisture retention ratio was determined by weight change



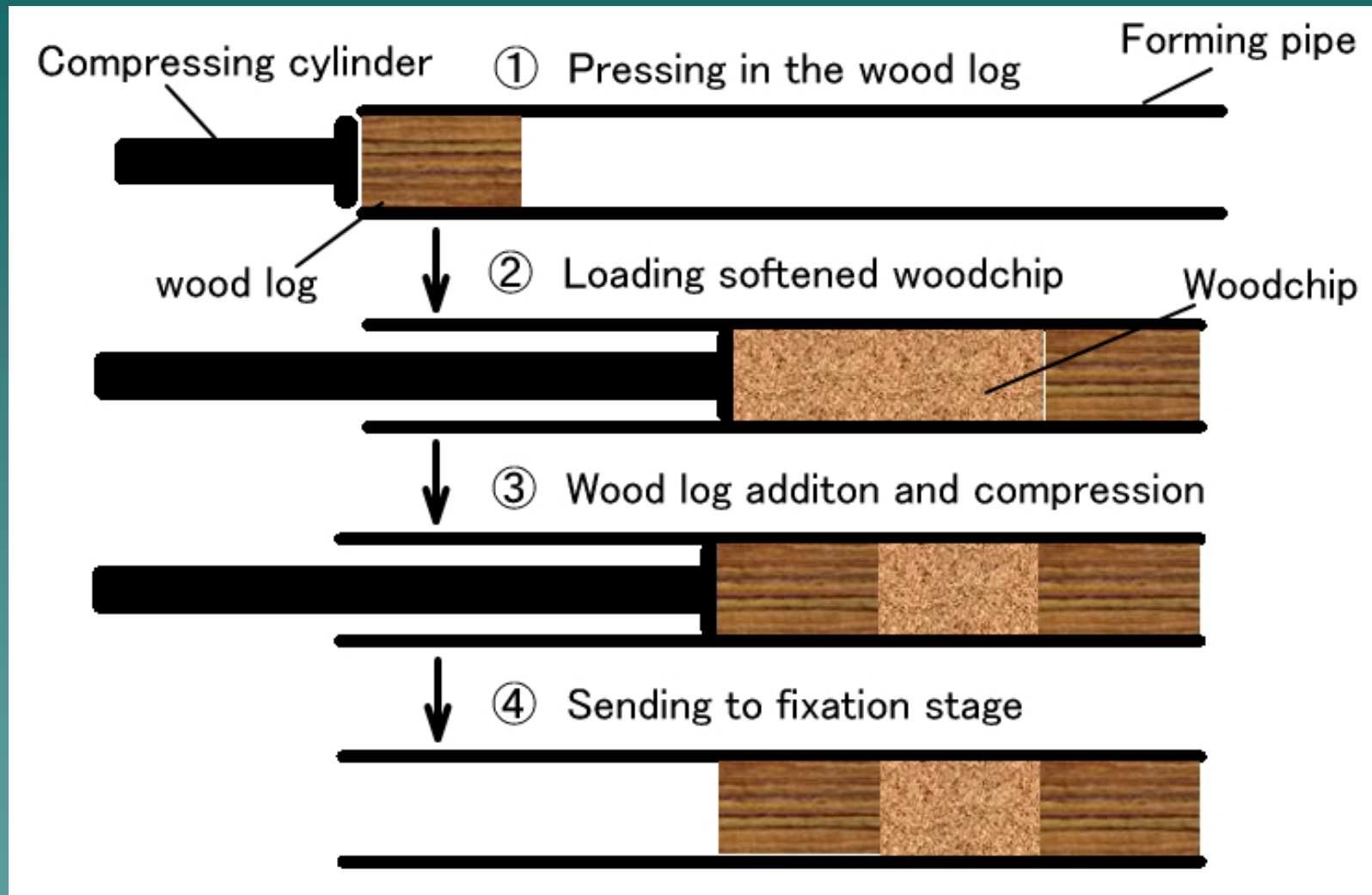
Water absorption was drastically increased by laying biomass board

- Board → Water was defused and efficiently absorbed
- RS, WC → Water was allowed to go down to the sand layer



The pot with biomass board retained more than 40g of water even after 4weeks.

Development of Biomass Block





Some cracks were observed



Lack of shape fixation?

Further investigation is required...

Conclusion

Significant **reduction of soil erosion** by board mulch

