





# Effect of different amendments on soil moisture, salinity, Oat growth and yield in a reclaimed coastal saline soil, Eastern China

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Table 1 Basic soil characteristics prior to the initiation of the experiment								
	Soil properties							
Soil depth	Sand	Silt	Clay	Bulk density	EC <sub>1:5</sub>	pH <sub>1:2.5</sub>	SAR	
	(%)	(%)	(%)	(g cm <sup>-3</sup> )	(dS m <sup>-1</sup> )			
0-10 cm	79.35	17.45	3.19	1.49	1.82	8.06	76.69	
10-20 cm	79.01	17.72	3.26	1.53	1.43	8.16	61.50	
20-40 cm	80.54	16.37	3.08	1.52	2.32	7.98	59.76	

#### Field experiment

Before experiment, each plot (3 m $\times$ 2 m) were insulated by double-plastic sheets buried to a 60 cm depth relative to the soil surface. All plots were plowed to a 20 cm depth and 6 treatments were applied in a randomized plot design with three replications. Oat was manually sown in drill on 3 November 2016 at a density of 90 kg ha<sup>-1</sup> in all plots.

#### Soil amendments



Table 2 Treatments design and management

Treatment	Managements
СК	Contorl
OM	Applied chicken manure (15t ha <sup>-1</sup> ) with a depth of 20cm.
PAM+OM	Applied PAM (2t ha <sup>-1</sup> ) and chicken manure (15t ha <sup>-1</sup> ) with a depth of 20cm.
SM+OM	Applied chicken manure (15t ha <sup>-1</sup> ) with a depth of 20cm, then mulch the wheat straw (15t ha <sup>-1</sup> ).
BS+OM	Applied buried wheat straw (15t ha <sup>-1</sup> ) and chicken manure (15t ha <sup>-1</sup> ) at a depth of 20 cm.
BM+OM	Applied chicken manure (15t ha <sup>-1</sup> ) and bacterial manure (Jiahua, 15t ha <sup>-1</sup> ) at a depth of 20cm

#### Soil sampling and laboratory analysis

During the growing season of oat, soil and plant samples were collected at 0–10, 10–20 and 20–40 cm depth with 30 days' intervals. the aboveground biomass was weighed after oven drying; oat yield was determined by weighing the grains.



Results

Soth precipitation and temperature were higher in spring (during 120-210 days after sowing, DAS) than in winter (during 30-120 days after sowing).

Fig. 5 Dynamics of soil moisture at 0-40 cm depths under the CK, OM, PAM+OM, SM+OM, BS+OM and BM+OM treatments during the oat growing season.







Fig. 6 Dynamics of soil salinity at 0-40 cm depths under the CK, OM, PAM+OM, SM+OM, BS+OM and BM+OM treatments during the oat growing season.

- Both soil moisture and soil salinity showed a strong temporal variability in surface soil.
- Soil amendment treatments increased surface soil moisture during the early and middle period of growing season.
- Soil amendment treatments significantly reduced soil salinity at 0-40 cm depth during growing season.

(a) $16$	
Stem diameter (mm)	
(b) <sup>150</sup> 120 (m) 90 90 40 50 50 50 50 50 50 50 50 50 50 50 50 50	
Fig. 7 Cha PAM+OM, BM+ and The CK tr Oat a 120	
Table 3 ( BS+OM and Treatme CK OM PAM+OM SM+OM BS+OM	
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Days after sowing

nges in oat stem diameter (a) and plant height (b) under the OM, SM+OM, BS+OM and BM+OM treatments during oat growing season.

OM treatment significantly promoted the stem diameter plant height of oat.

stem diameter and plant height were not observed under eatment.

growth under OM treatment was obviously inhibited after days after sowing.

Dat Aboveground biomass and yield under CK, OM, PAM+OM, SM+OM, d BM+OM treatments. (N/S means not observed)

nts	Aboveground biomass (kg ha <sup>-1</sup> )	Yield (kg ha⁻¹)
	N/S	N/S
	590 $\pm$ 163 d	215 $\pm$ 60 d
	16217 ± 1026 b	5856 ± 371 b
	16460 ± 684 b	6004 ± 250 b
	13633 ± 1200 c	4923 ± 434 c
	21967 ± 1041 a	8091 ± 383 a

average oat aboveground biomass and yield of ndment treatments followed the order of BM+OM > OM > PAM+OM > BS+OM > OM treatment.

difference between PAM+OM, SM+OM treatment were ignificant.

### Conclusions

study demonstrated that all applied amendment tments had significant effects on dynamics of soil moisture, salinity, oat growth and yield.

at straw was more cost-effective than Polyacrylamide and erial manure.

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