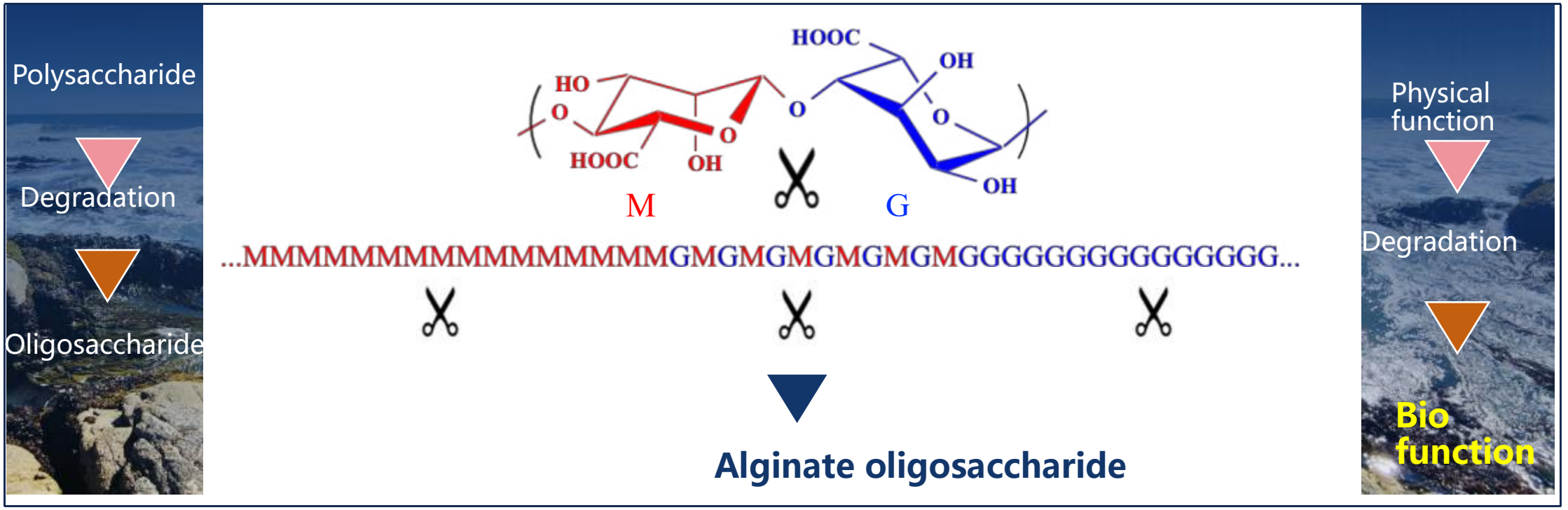
Alginate Oligosaccharide

DK-AOS

Qingdao Dakang Marine Biotechnology Co., Ltd
a subsidiary of Qingdao Gather Great Ocean Algae Industry Group Co., Ltd.

Alginate Oligosaccharide

DK-AOS is composed of D-mannuronic acid and L-glucuronic acid with weight-average molecular weight not exceeding 2000 Da.



Production methond

Extraction

- Hydrolysis
- Decolorization
- Membrane Filtration
- Drying Process

Application in agriculture

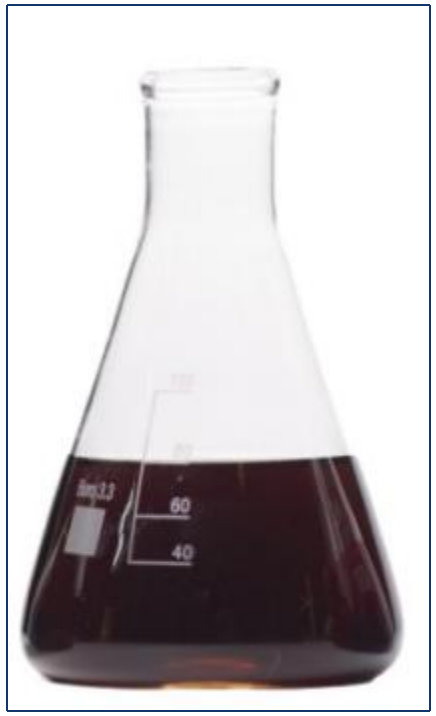
New biostimulants——

Alginate Oligosaccharide (AOS)




Parameters

Powder



Liquid

- Alginate oligosaccharide(AOS)
- Appearance: Light yellow to yellow powder, or tan liquid
- Content: powder≥90%, liquid≥30%
- Moisture: ≤10% (powder)
- Ash: ≤30% (powder)
- Water insoluble matter: ≤2%
- pH (1%) : 5.0~7.0

Alginate oligosaccharide

sodium alginate

▼

Degrade—Refine

▼

Spray drying

AOS content≥90%

VS

Enzymatically hydrolyzed kelp

Kelp

▼

enzymolysis—Filteration

▼

Spray drying

AOS content20%~30%

Function——Regulates nitrogen metabolism in plants

Rape foliar after using AOS:

- Total nitrogen concentration in leaves increase by **4.9~13.2%；**
- Nitrate reductase increases by **4.04–14.41%；**
- Glutamine synthetase increases by **23.57–190.12%；**
- Glutamate dehydrogenase increases by **03.44–265.21%；**
- Tepeptidase increases by **7.22–157.41%；**
- Accelerate the absorption of nitrogen in leaves, and promote the synthesis and transfer of proteins.

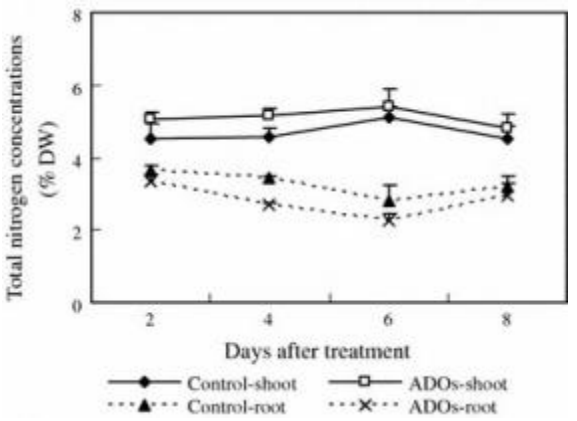


图1 对叶片和根中总氮浓度的影响

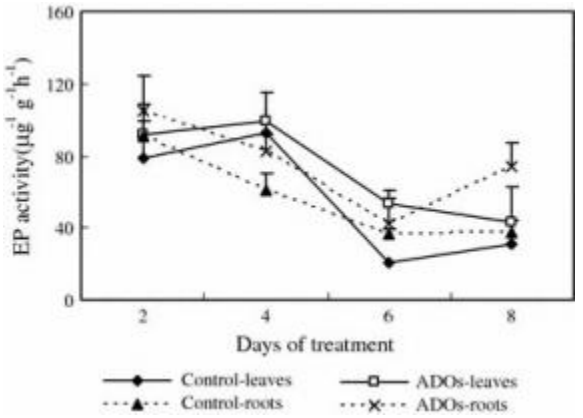


图2 对叶片和根中内肽酶活力的影响

表1对叶片和根中铵态氮和硝态氮的影响

Days after treatment	Treatment	Leaves			Roots		
		NH_4^+-N concentration (mg kg^{-1})	NO_3^--N concentration (mg kg^{-1})	NH_4^+-N/NO_3^--N	NH_4^+-N concentration (mg kg^{-1})	NO_3^--N concentration (mg kg^{-1})	NH_4^+-N/NO_3^--N
2	Control	503.57 d	1151.71 a	0.437 b	347.79 b	422.68 bc	0.823 bc
	ADOs	365.26 e	1282.84 a	0.285 b	227.35 d	575.77 a	0.395 d
4	Control	424.75 e	1294.74 a	0.328 b	251.96 cd	476.24 ab	0.527 cd
	ADOs	851.77 abc	916.35 b	0.930 a	470.77 a	373.71 cd	1.260 a
6	Control	887.97 ab	881.75 b	1.007 a	251.55 cd	330.71 de	0.761 bc
	ADOs	811.51 bc	810.63 b	1.001 a	318.32 bc	243.55 e	1.307 a
8	Control	813.26 bc	780.45 b	1.042 a	331.67 b	320.06 de	1.036 bc
	ADOs	906.18 a	942.53 b	0.961 a	313.85 bc	360.95 cd	0.870 bc

Mean values with different letters are significantly different ($P < 5\%$)

Zhang, et al. Plant Growth Regulation, 2011,64, 192-202 .

Function——Promote plant growth

生长指标 Growth indicators	7 d		14 d		21 d		28 d	
	CK	AOS	CK	AOS	CK	AOS	CK	AOS
株高(cm) Plant height (cm)	7.7±0.9a	8.5±1.1a	12.9±1.2b	20.1±0.8a	18.4±0.6b	27.3±0.7a	23.2±1.2b	33.5±1.0a
根长(cm) Root length (cm)	3.3±0.4a	3.7±0.3a	6.6±0.5b	10.8±0.8a	9.1±0.6b	14.7±0.8a	11.6±0.6b	17.0±0.7a

表1 AOS对小麦幼苗根长、株高生长促进作用

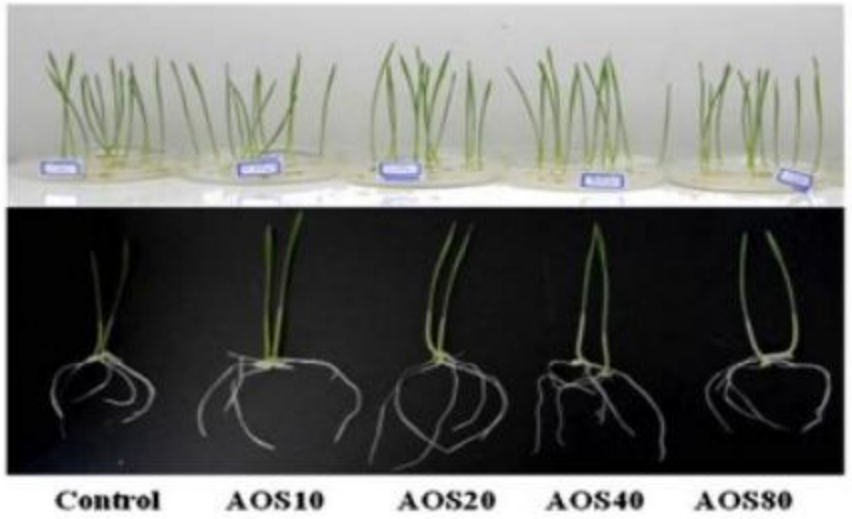
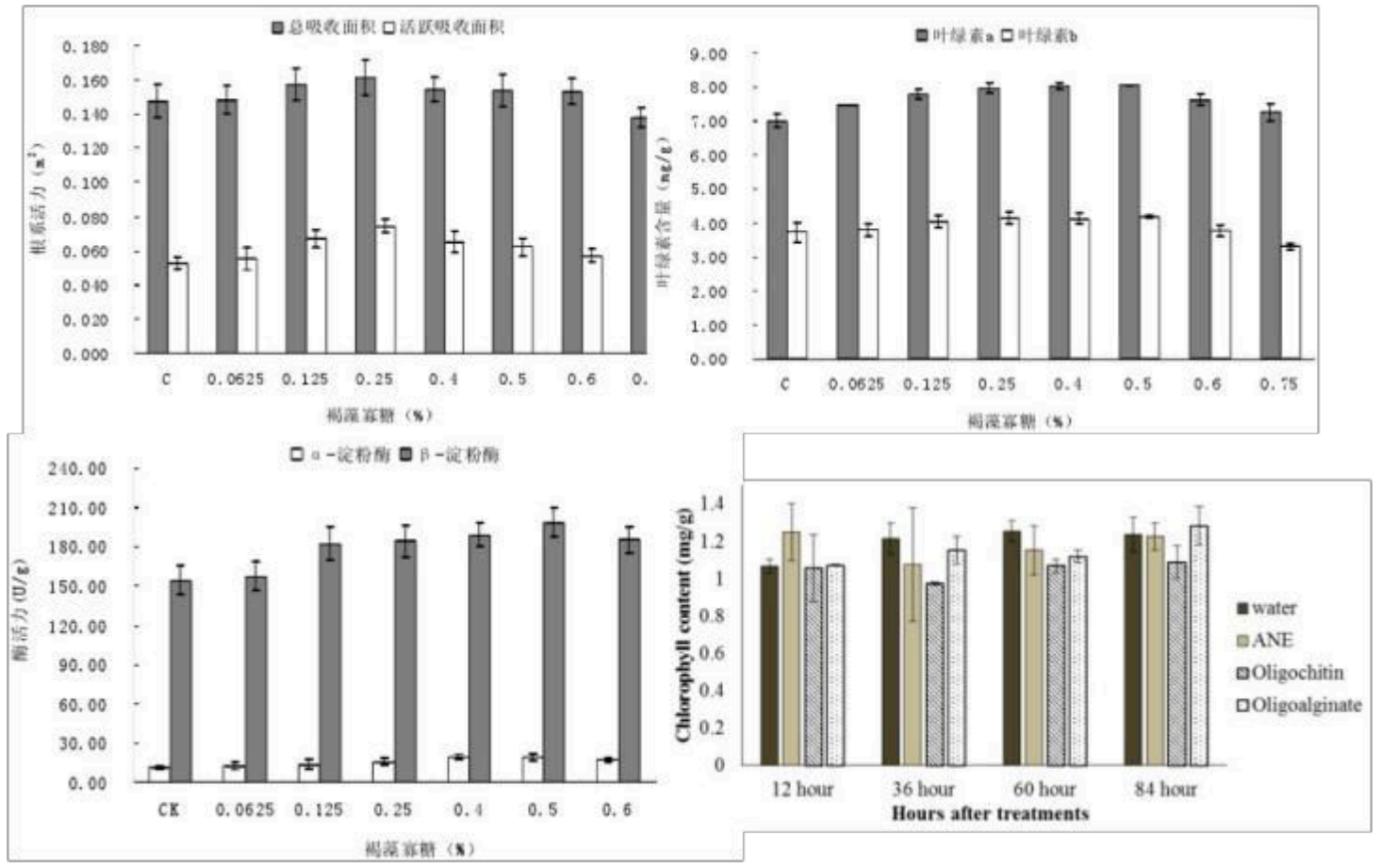


图1 AOS对小麦根系鲜重、最长主根表面积和长度影响

As a new biostimulant, AOS can promote seed germination and seedling growth, increase the chlorophyll synthesis rate of leaves and the enzyme activity of seeds, enhance plant photosynthesis, improve the growth and development of plant roots, enhance root vitality, improve water and nutrient absorption capacity, and promote crop growth.

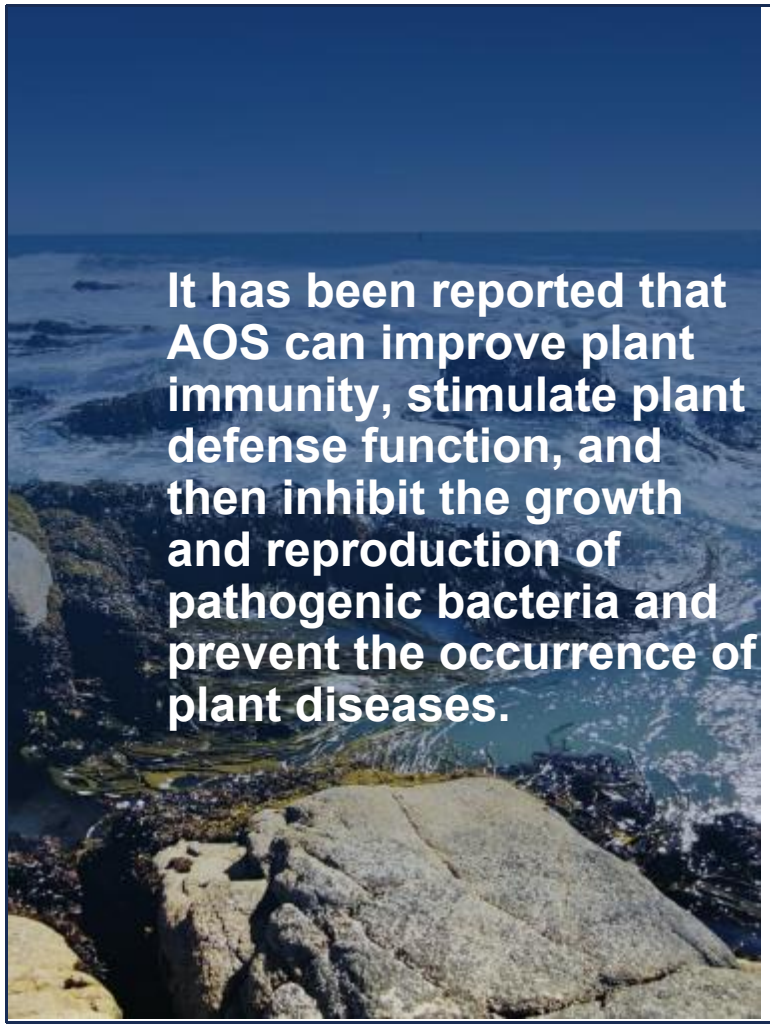
王婷婷.海洋寡糖对植物促生长及生理特性的研究.中国海洋大学.2012.



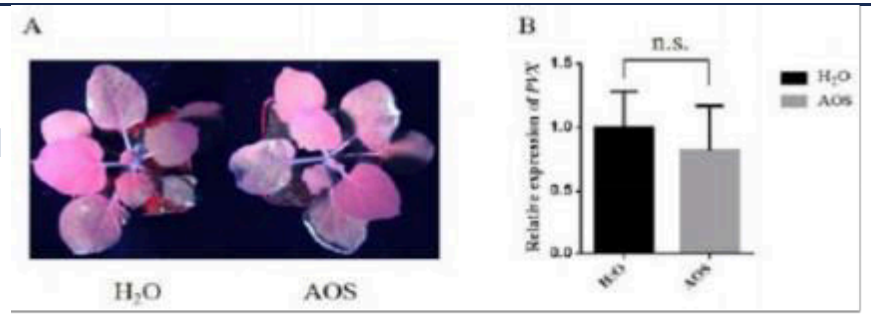
The study showed that AOS treatment could significantly promote the growth of the tested crops, and the total uptake area and active uptake area of roots increased by 9.18% and 40.74%, respectively. The contents of chlorophyll a and b increased by 14.91% and 12.38% respectively.

Koh Y. Saint Mary's University. 2016.

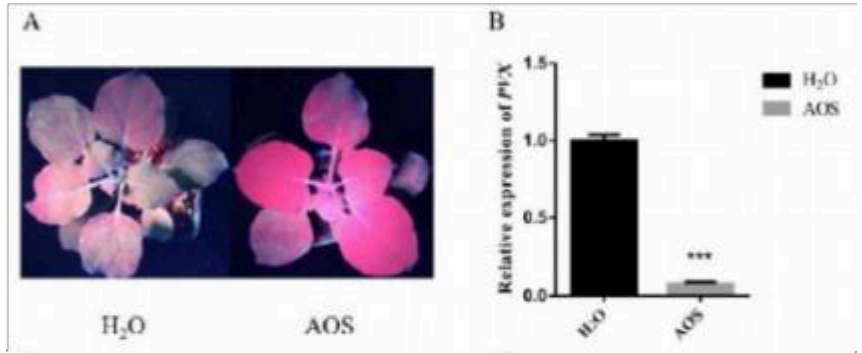
Function——Improve plan immunity



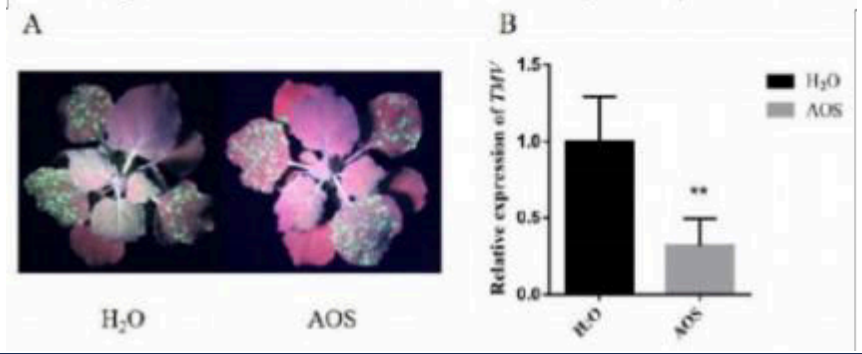
Potato virus X is inoculated first and then spray AOS

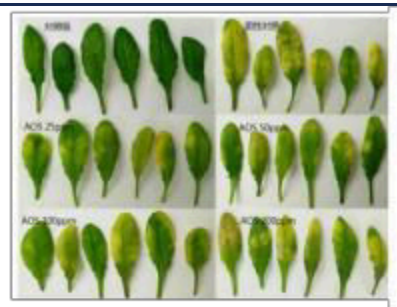


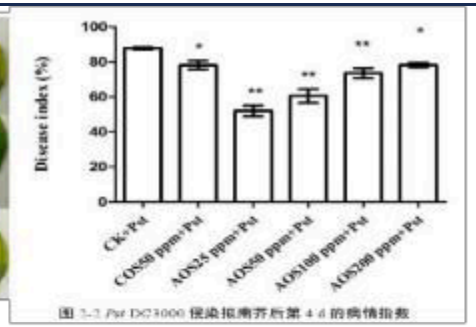
First spray AOS, then inoculate potato virus X

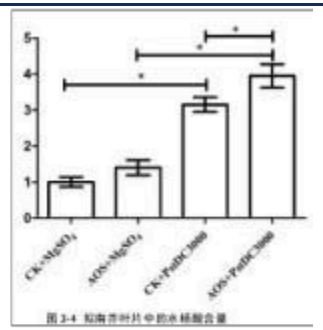


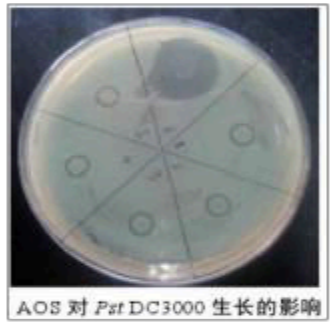
Spray AOS first and then inoculate with mosaic virus



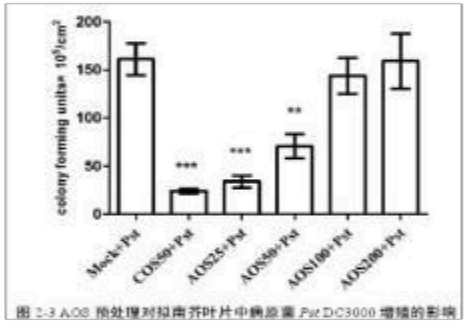


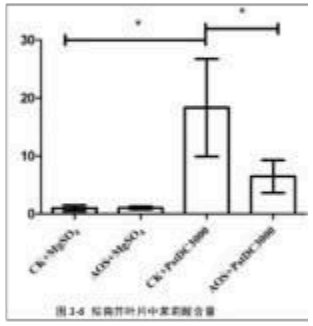






AOS 对 *Pst* DC3000 生长的影响





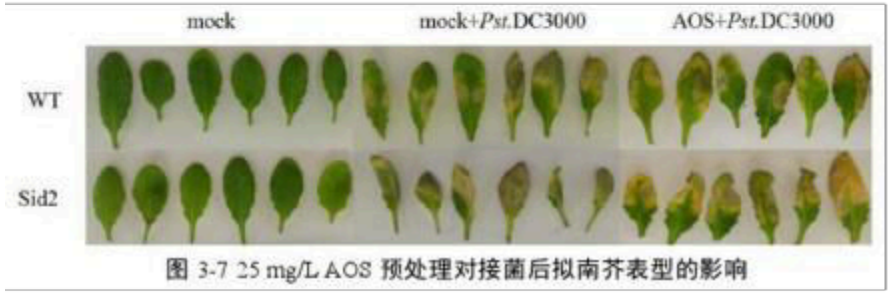
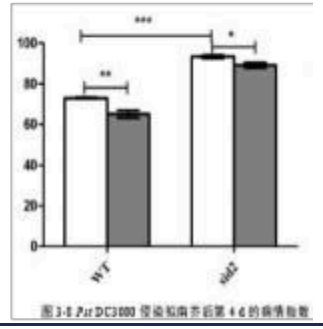


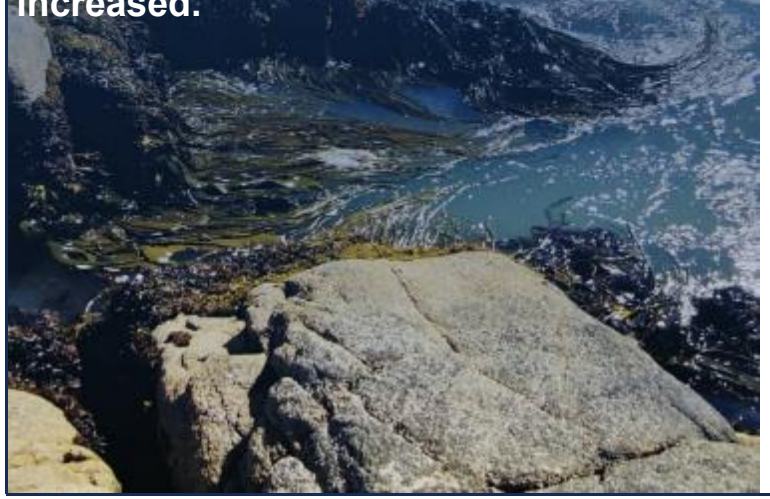
图 3-7 25 mg/L AOS 预处理对接菌后拟南芥表型的影响

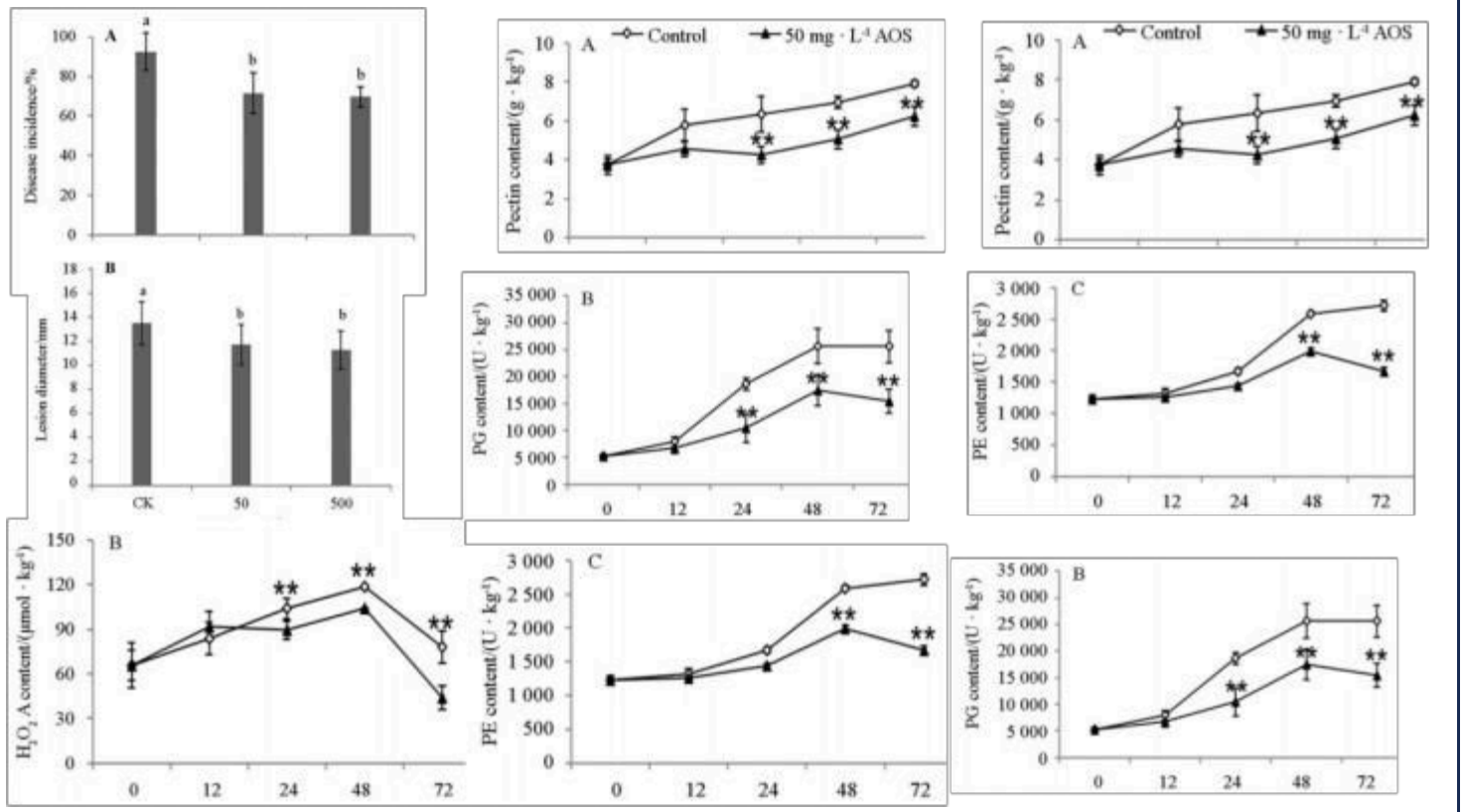


刘同梅.海藻酸钠寡糖诱导植物抗病作用和机制的初步研究.大连海洋大学.2024.

Function——Extend the storage period of fruits

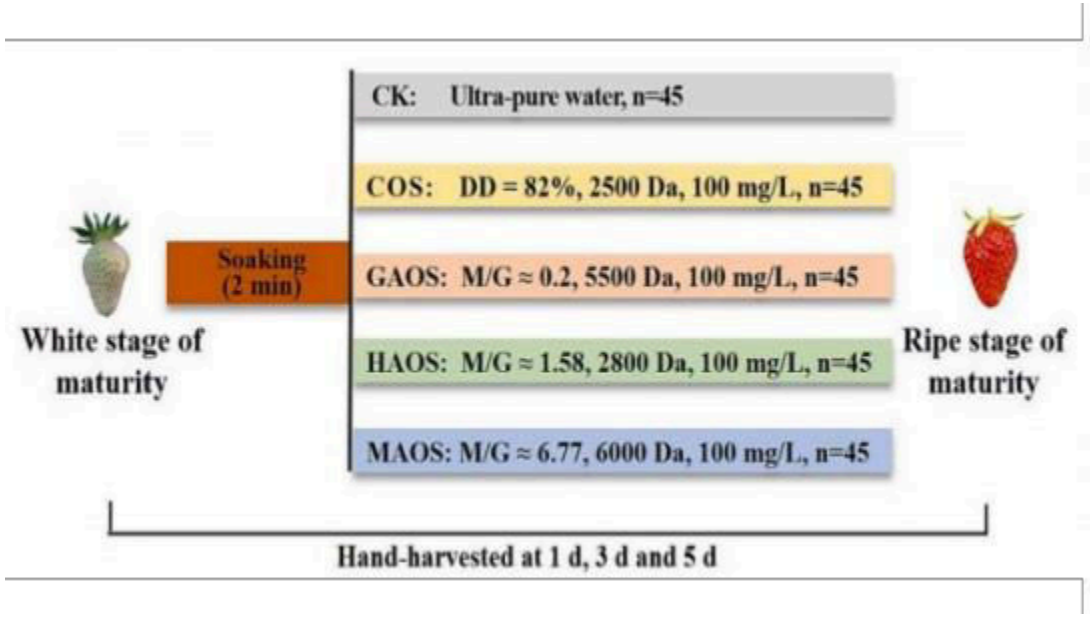
It is reported that using 50 and 100ppm AOS treatment of kiwifruit, mildew rot respectively 22.78% and 24.45% lower, plaque diameter significantly reduced. AOS can improve the antioxidant capacity of fruits, ROS was reduced by 44% and the activity of related anti-enzymes (PPO, PAL and GLU) was significantly increased.

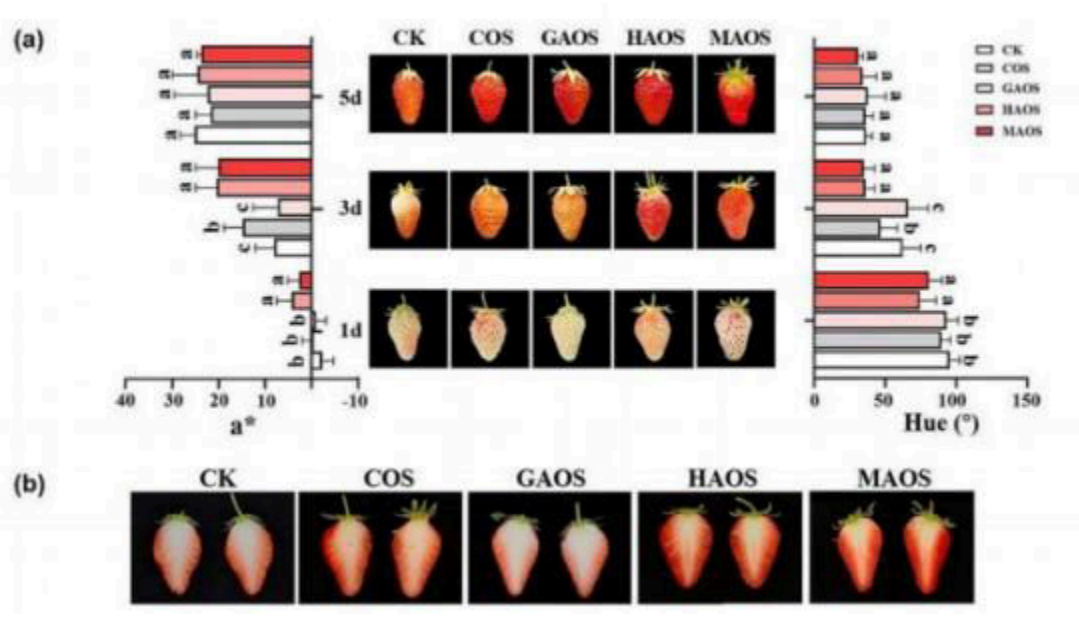




Zhuo, et al. Horticultural Plant Journal, 2022,8, 44-52 .

Function——Improve fruit colour

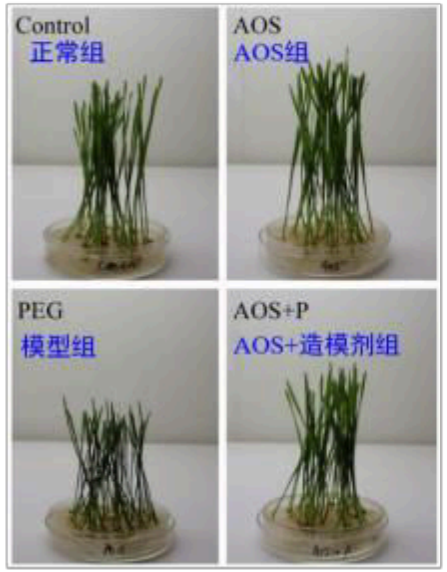




It has been reported that AOS can trigger the jasmonic acid pathway, which can promote the increase of anthocyanin metabolism, which in turn enhances the color of strawberries. In addition, AOS spraying on the leaf/fruit surface of strawberries before maturity can significantly extend the shelf life of strawberries after ripening.

Liu, et al. Carbohydrate Polymers, 2024,323, 121422 .

Function——Enhance plant stress resistance



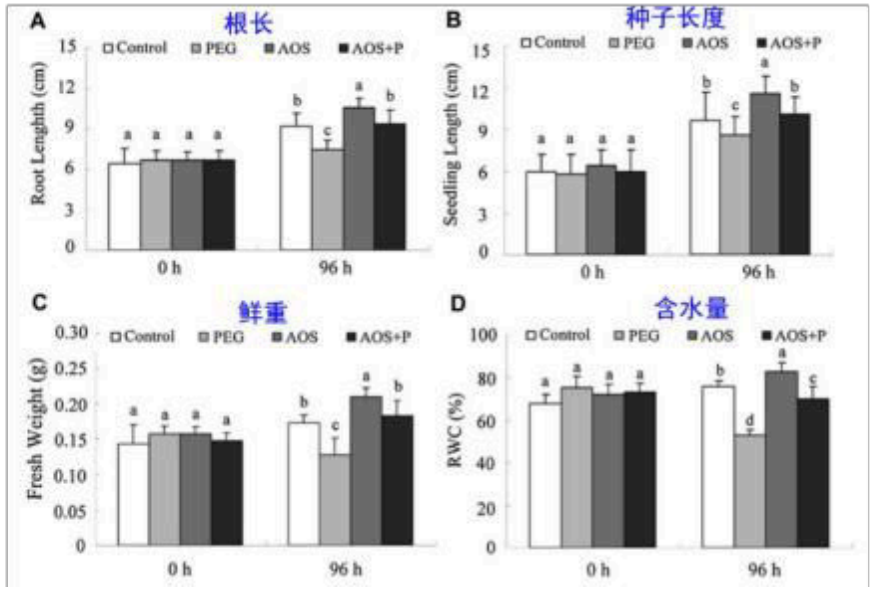


图1 AOS增强植物对抗干旱胁迫的能力

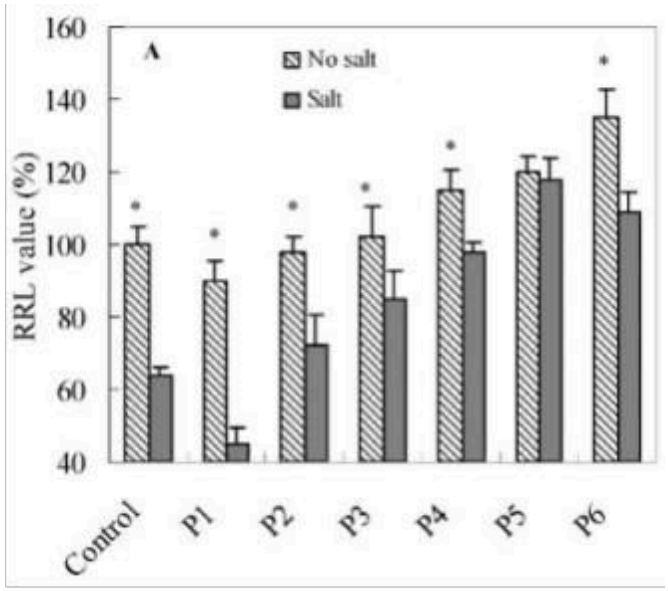


图1 AOS在高盐环境下起到渗透保护剂的作用

The report shows that AOS plays the role of a signaling molecule in plant stress resistance. After the application of AOS, it can enhance the ability of plants to resist environmental stresses such as drought, salt, cold, light and heavy metals, improve the adaptability and survival ability of plants, and maintain a high survival rate and growth rate.

Function——Improve soil structure

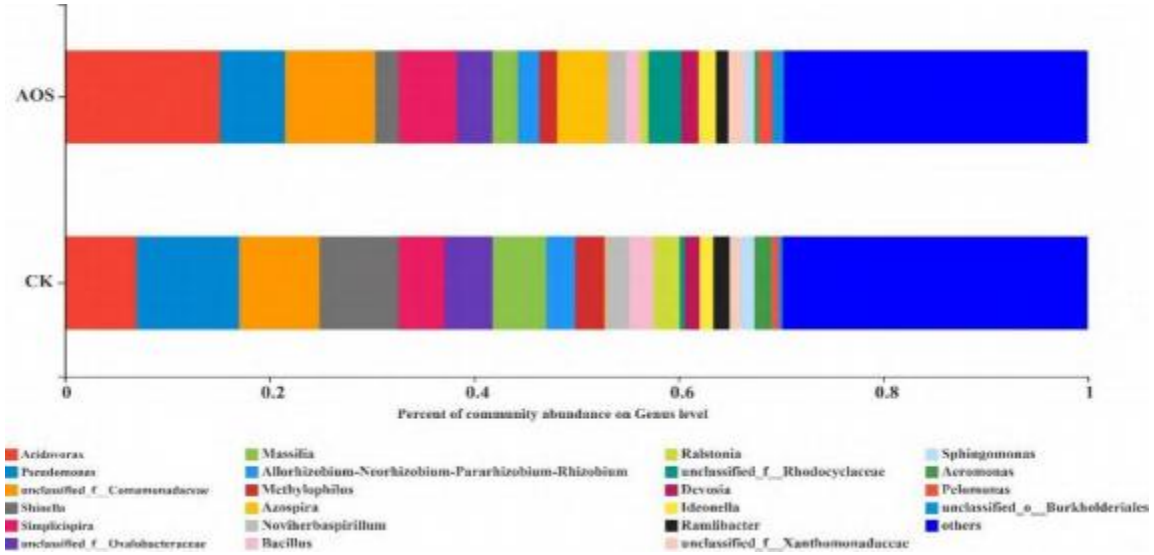
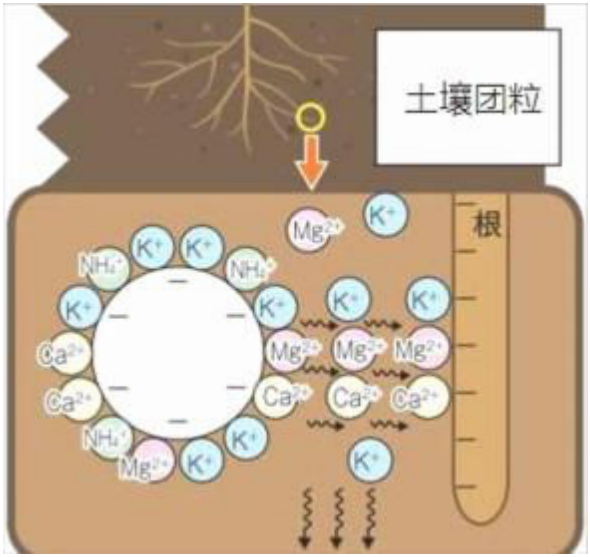


图 1 AOS 处理根际土壤中细菌群落的组成与丰度差异



The report showed that AOS could increase the number of beneficial bacteria in the soil and promote the decomposition and transformation of organic matter. It can promote the release of large, medium and micro elements in the soil and improve the utilization rate of fertilizer; It can increase the stable structure of soil aggregates and the content of organic matter in the soil, and improve the water and fertilizer retention capacity of the soil

胡静等.褐藻寡糖对土壤养分、小麦生长以及根际微生物多样性的影响.分子植物育种, 2024.

Application example——Potted cabbage

表1实验分组以及结果

分组	植株重量	增产率
CK （清水）	85g	/
处理一 AOS水剂 25ppm	108g	27%
处理二 AOS水剂 50ppm	120g	41%

The experiment showed that spraying AOS water agent could effectively promote the root growth and treatment of Chinese cabbage1. 2. Production increased by 27% and 41% respectively

Application example——Tea tree field experiement（Laoshan）

The test results showed that the contents of water extract, soluble sugar and free amino acids in tea were increased after spraying AOS aqueous agent, and the yield of fresh leaves increased by 12.6~22.1% respectively. AOS can significantly increase the yield and quality of tea leaves.

表1 AOS水剂对茶叶中内含物含量的测定结果

处理组	水浸出物含量（%）	可溶性糖含量 (%)	游离氨基酸含量 (%)	茶多酚含量 (%)
CK	35.23±1.38a	3.43±0.18a	1.93±0.23a	18.65±1.25a
T1	36.85±1.64ab	3.65±0.18ab	2.01±0.20a	18.75±1.55a
T2	38.50±1.49b	3.80±0.15b	2.13±0.27a	19.03±1.42a

表2 AOS水剂对鲜叶产量的影响

实验田	采收日期	处理组 kg/亩	对照组 kg/亩	增长率 %	平均增长率 %
1#	5月7日	13.4	10.8	24.1	22.1
	5月12日	8.4	7.0	20.0	
2#	5月6日	14.7	12.4	18.7	12.6
	5月9日	21.3	20.0	6.5	

How to use

Direct usage	Recommended usage/mu	
	30%liquid	90%powder
Flush	150~350g	50~100g
Spray	1~1.7g	0.3~0.5g

Instruction

with other products	Recommened dosage (kilo/ton)	
	30%liquid	90%powder
Compound fertilizer	0.5~1	0.15~0.35
flushing fertilizer	3~10	1~3
Spraying fertilizer	15~30	5~10