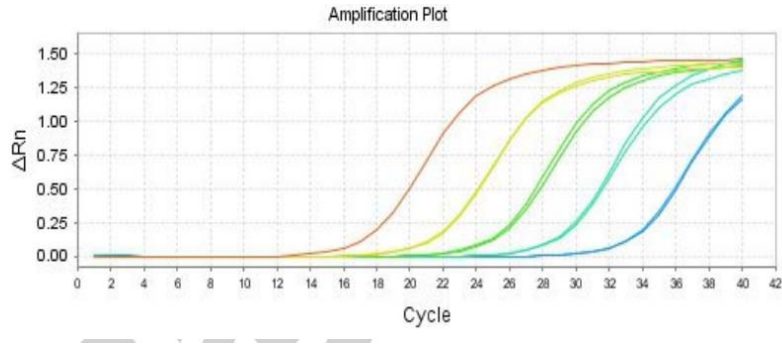


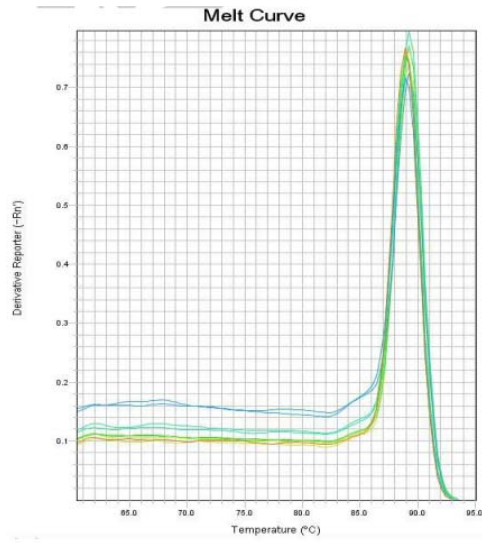
Appendix A. Amounts of total and extractable soil nutrients in the unfertilized soil sample at the start of the long-term field experiment in Chuanshan on Oct 1982. Values are means of samples collected from all experimental plots.

Soil type	pH	OM (%)	Total amounts (%)			Extractable amounts (mg kg soil ⁻¹)							
			N	P	K	N	AP	AK	SRP	Mn	B	Mo	Zn
Calcareous purplish paddy soil	8.6	1.59	0.109	0.135	2.689	66.3	3.9	130.6	699.4	6.9	0.18	0.06	0.74

Note: OM=organic matter, AP=available phosphorus, AK=available potassium, SRP=soluble reactive phosphorus.



Appendix B. The standard curves for *nosZ* gene created using 10-fold dilution series (10^3 - 10^7 copies) of the plasmids containing the *nosZ* gene. Standard curve descriptors and detection levels: slope: -3.41 to -3.80, $R^2 = 0.991$ - 0.999 , E = 96.4 %. Values are means \pm SD ($n=3$).



Appendix C. The melting curves of the *nosZ* gene standard curves.

Appendix D. the *nosZ* gene copies of the 32 samples from soil

Sample Name	Target Name	C _T	C _T Mean	C _T SD	Quantity	Quantity Mean
standard	NOSZ	19.83652687	19.16134262	0.954856098	53680000	
standard	NOSZ	18.48615646	19.16134262	0.954856098	53680000	
standard	NOSZ	22.61953926	22.67045212	0.072000302	5368000	
standard	NOSZ	22.72136307	22.67045212	0.072000302	5368000	
standard	NOSZ	26.08469582	26.2156868	0.185249224	536800	
standard	NOSZ	26.34667778	26.2156868	0.185249224	536800	
standard	NOSZ	29.98692513	30.05860901	0.101376317	53680	
standard	NOSZ	30.13029289	30.05860901	0.101376317	53680	
standard	NOSZ	34.45157242	34.50404358	0.074208125	5368	
standard	NOSZ	34.55651855	34.50404358	0.074208125	5368	
L2-1	NOSZ	28.49472809	28.67527199	0.228769645	162742.802	146822.3602
L2-1	NOSZ	28.9325428	28.67527199	0.228769645	124885.2995	146822.3602
L2-1	NOSZ	28.59854698	28.67527199	0.228769645	152838.979	146822.3602
L2-2	NOSZ	27.79789925	28.18968773	0.359725386	248039.812	198881.0784
L2-2	NOSZ	28.26608849	28.18968773	0.359725386	186875.8424	198881.0784
L2-2	NOSZ	28.50507545	28.18968773	0.359725386	161727.5808	198881.0784
L2-3	NOSZ	27.45519638	27.54151726	0.116247959	305162.4382	290112.3442
L2-3	NOSZ	27.49565315	27.54151726	0.116247959	297786.6675	290112.3442
L2-3	NOSZ	27.67370033	27.54151726	0.116247959	267387.927	290112.3442
L2-4	NOSZ	27.66504478	27.80187798	0.148082495	268791.2599	248101.8365
L2-4	NOSZ	27.78148842	27.80187798	0.148082495	250513.7908	248101.8365
L2-4	NOSZ	27.95909691	27.80187798	0.148082495	225000.4588	248101.8365

L2-5	NOSZ	27.51262093	27.63156891	0.219127014	294746.5461	275855.6261
L2-5	NOSZ	27.4976387	27.63156891	0.219127014	297429.3021	275855.6261
L2-5	NOSZ	27.8844471	27.63156891	0.219127014	235391.0302	275855.6261
L2-6	NOSZ	27.98667908	28.0870266	0.159540489	221278.4118	208884.0359
L2-6	NOSZ	28.00340462	28.0870266	0.159540489	219051.4551	208884.0359
L2-6	NOSZ	28.27099419	28.0870266	0.159540489	186322.2408	208884.0359
L2-7	NOSZ	27.72193146	27.9186039	0.184108347	259701.263	231540.0302
L2-7	NOSZ	27.94704819	27.9186039	0.184108347	226645.9471	231540.0302
L2-7	NOSZ	28.08683777	27.9186039	0.184108347	208272.8805	231540.0302
L2-8	NOSZ	27.37806702	27.42002869	0.069004066	319734.0052	311901.9829
L2-8	NOSZ	27.38234711	27.42002869	0.069004066	318907.4592	311901.9829
L2-8	NOSZ	27.49966812	27.42002869	0.069004066	297064.4842	311901.9829
L3-1	NOSZ	29.11318588	29.12697029	0.047019608	111960.8173	111061.1255
L3-1	NOSZ	29.17934227	29.12697029	0.047019608	107569.7902	111061.1255
L3-1	NOSZ	29.08838463	29.12697029	0.047019608	113652.7689	111061.1255
L3-2	NOSZ	29.14180756	29.10803413	0.072045013	110039.5181	112381.8331
L3-2	NOSZ	29.15698814	29.10803413	0.072045013	109033.9016	112381.8331
L3-2	NOSZ	29.0253067	29.10803413	0.072045013	118072.0797	112381.8331
L3-3	NOSZ	27.56052399	27.65500069	0.081918471	286330.2002	270652.33
L3-3	NOSZ	27.70627022	27.65500069	0.081918471	262172.678	270652.33
L3-3	NOSZ	27.69820786	27.65500069	0.081918471	263454.1117	270652.33
L3-4	NOSZ	28.81987572	28.86056709	0.105233528	133691.2324	130615.6318
L3-4	NOSZ	28.98007202	28.86056709	0.105233528	121346.6915	130615.6318
L3-4	NOSZ	28.78175735	28.86056709	0.105233528	136808.9716	130615.6318
L3-5	NOSZ	27.70642281	27.97373199	0.256405711	262148.4859	224821.565

L3-5	NOSZ	27.99714279	27.97373199	0.256405711	219882.562	224821.565
L3-5	NOSZ	28.21762848	27.97373199	0.256405711	192433.6471	224821.565
L3-6	NOSZ	27.40507889	27.70363808	0.272563875	314553.3078	265016.8492
L3-6	NOSZ	27.76667976	27.70363808	0.272563875	252767.4103	265016.8492
L3-6	NOSZ	27.93915939	27.70363808	0.272563875	227729.8294	265016.8492
L3-7	NOSZ	28.4499588	28.46100044	0.00956598	167209.2436	166098.1331
L3-7	NOSZ	28.46674347	28.46100044	0.00956598	165520.5227	166098.1331
L3-7	NOSZ	28.46630287	28.46100044	0.00956598	165564.6329	166098.1331
L3-8	NOSZ	27.48799324	27.78034973	0.257300019	299169.3502	252765.9311
L3-8	NOSZ	27.88071251	27.78034973	0.257300019	235923.2738	252765.9311
L3-8	NOSZ	27.97234344	27.78034973	0.257300019	223205.1693	252765.9311
L4-1	NOSZ	29.05927277	29.03911781	0.142412126	115671.4414	117381.4579
L4-1	NOSZ	29.17037773	29.03911781	0.142412126	108154.5577	117381.4579
L4-1	NOSZ	28.88770103	29.03911781	0.142412126	128318.3745	117381.4579
L4-2	NOSZ	29.00986099	28.98298836	0.023313222	119180.1625	121140.8195
L4-2	NOSZ	28.96816444	28.98298836	0.023313222	122223.6988	121140.8195
L4-2	NOSZ	28.97094154	28.98298836	0.023313222	122018.5971	121140.8195
L4-3	NOSZ	28.7949543	28.70047569	0.085689105	135721.4365	143830.0182
L4-3	NOSZ	28.67868614	28.70047569	0.085689105	145608.2103	143830.0182
L4-3	NOSZ	28.62778282	28.70047569	0.085689105	150160.4078	143830.0182
L4-4	NOSZ	undetermined	undetermined	undetermined	undetermined	undetermined
L4-4	NOSZ	34.00016022	33.84511948	0.219260722	5828.002377	6429.051272
L4-4	NOSZ	33.69007874	33.84511948	0.219260722	7030.100167	6429.051272
L4-5	NOSZ	33.82095337	34.04293442	0.288229108	6495.12866	5735.265048
L4-5	NOSZ	34.36867905	34.04293442	0.288229108	4663.688843	5735.265048

L4-5	NOSZ	33.93917084	34.04293442	0.288229108	6046.977641	5735.265048
L4-6	NOSZ	34.26451492	33.86875534	0.351655066	4966.928425	6402.492585
L4-6	NOSZ	33.74956512	33.86875534	0.351655066	6781.685188	6402.492585
L4-6	NOSZ	33.59218597	33.86875534	0.351655066	7458.864141	6402.492585
L4-7	NOSZ	29.79051018	29.96342278	0.156766713	74330.87672	67153.60193
L4-7	NOSZ	30.09626579	29.96342278	0.156766713	61782.23796	67153.60193
L4-7	NOSZ	30.00349236	29.96342278	0.156766713	65347.69112	67153.60193
L4-8	NOSZ	34.25214767	34.49966812	0.308302939	5004.216786	4357.232902
L4-8	NOSZ	34.84501648	34.49966812	0.308302939	3496.401058	4357.232902
L4-8	NOSZ	34.40184402	34.49966812	0.308302939	4571.080863	4357.232902
L1-1	NOSZ	24.68845367	24.78811836	0.138301983	1626320.581	1534712.085
L1-1	NOSZ	24.72988892	24.78811836	0.138301983	1586073.612	1534712.085
L1-1	NOSZ	24.9460144	24.78811836	0.138301983	1391742.062	1534712.085
L1-2	NOSZ	25.20140648	25.21077919	0.150667578	1192561.919	1189096.505
L1-2	NOSZ	25.06501579	25.21077919	0.150667578	1295100.478	1189096.505
L1-2	NOSZ	25.36591339	25.21077919	0.150667578	1079627.119	1189096.505
L1-3	NOSZ	24.77610397	24.83661842	0.061684709	1542357.751	1487622.31
L1-3	NOSZ	24.83433914	24.83661842	0.061684709	1488983.418	1487622.31
L1-3	NOSZ	24.89941025	24.83661842	0.061684709	1431525.762	1487622.31
L1-4	NOSZ	25.31943321	25.36183167	0.102924272	1110405.586	1083679.625
L1-4	NOSZ	25.28687668	25.36183167	0.102924272	1132485.095	1083679.625
L1-4	NOSZ	25.47918129	25.36183167	0.102924272	1008148.194	1083679.625
L1-5	NOSZ	24.95841217	25.07777214	0.278612286	1381346.157	1296979.343
L1-5	NOSZ	24.87872505	25.07777214	0.278612286	1449546.197	1296979.343
L1-5	NOSZ	25.3961792	25.07777214	0.278612286	1060045.676	1296979.343

L1-6	NOSZ	24.58916855	24.61879539	0.16692622	1726963.033	1702014.644
L1-6	NOSZ	24.46866417	24.61879539	0.16692622	1857518.235	1702014.644
L1-6	NOSZ	24.79854965	24.61879539	0.16692622	1521562.664	1702014.644
L1-7	NOSZ	24.30563354	24.35908699	0.047133841	2049993.559	1985322.059
L1-7	NOSZ	24.37695313	24.35908699	0.047133841	1963453.696	1985322.059
L1-7	NOSZ	24.39467812	24.35908699	0.047133841	1942518.923	1985322.059
L1-8	NOSZ	24.36518669	24.66145515	0.291299552	1977475.336	1670289.941
L1-8	NOSZ	24.67166519	24.66145515	0.291299552	1642916.884	1670289.941
L1-8	NOSZ	24.9475174	24.66145515	0.291299552	1390477.602	1670289.941

Appendix E. The Person correlation analysis of dominant T-RFs and environment factors

T-RFs	pH	SOM	Water Content	TN	Nitrate	ammonium	AP	AK
45 bp	-0.369*	0.460**	-0.330	0.408*	0.055	0.278	0.489**	-0.088
90 bp	-0.036	0.717**	-0.287	0.458**	0.070	0.080	0.239	-0.115
300 bp	0.543**	-0.148	0.465**	-0.116	-0.362*	-0.218	-0.257	-0.180
330 bp	-0.394*	0.588**	-0.337	0.480**	0.346	0.319	0.388**	-0.355*
350 bp	0.236	-0.115	-0.050	-0.212	-0.307	0.003	-0.068	0.291
355 bp	0.032	0.713**	-0.134	0.382*	-0.023	0.141	0.185	-0.097
450 bp	0.125	0.014	0.059	-0.099	-0.063	-0.341	-0.212	0.128

*: p<0.05; **: p<0.01

Appendix F. Abundances of *nosZ* OTUs in different soil depths.

	OTU 1	OTU 2	OTU 3	OTU 4	OTU 5	OTU 6	OTU 7	OTU 8	OTU 9	OTU 10	OTU 11	OTU 12	OTU 13	OTU 14	OTU 15	OTU 16	OTU 17	OTU 18	OTU 19	OTU 20	OTU 21	OTU 22
L1	8	4	3	4	1	3	6	0	8	0	0	9	1	0	1	1	2	1	0	0	5	11
L2	5	0	0	0	4	7	0	5	0	8	5	0	0	5	2	0	0	0	6	4	0	0
L3	4	0	7	4	0	0	3	7	9	0	5	5	4	0	4	4	6	0	0	4	0	0
L4	5	0	7	6	0	0	6	0	0	0	6	3	2	3	0	0	0	5	0	0	8	0

Note: (1) L1, 0-20 cm; L2, 20-40 cm; L3, 40-60 cm; L4, 60-80 cm.

OTU1: GI:KR066494, OTU2: GI:KR066516/KR066496/KR066518/KR066499, OTU3: GI:KR066500, OTU4: GI:KR066506, OTU5: GI:KT329434, OTU6: GI:KR066505/KT329436/KT329433/KR066503/KR066502/KT329438, OTU7: GI:KR066515, OTU8: GI:KR066514, OTU9: GI:KR066495, OTU10: GI:KR066508, OTU11: GI:KR066507, OTU12: GI:KR066512, OTU13: GI:KT329437, OTU14: GI:KR066509, OTU15: GI:KR066501, OTU16: GI:KR066504, OTU17: GI:KR0665103, OTU18: GI:KR066497, OTU19: GI:KR066497, OTU20: GI:KR066510, OTU21: GI:KR066511, OTU22: GI:KR066517.

Appendix H. Abundances of nosZ OTUs in different fertilization treatments

	OTU 1	OTU 2	OTU 3	OTU 4	OTU 5	OTU 6	OTU 7	OTU 8	OTU 9	OTU 10	OTU 11	OTU 12	OTU 13	OTU 14	OTU 15	OTU 16	OTU 17	OTU 18	OTU 19	OTU 20	OTU 21	OTU 22
CK	6	0	0	2	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0
N	3	0	1	3	0	0	0	1	0	0	2	3	0	0	1	0	0	0	1	0	0	0
NP	3	0	3	4	0	0	0	0	0	0	2	4	0	4	3	0	0	0	1	0	1	1
NPK	5	0	1	1	0	0	0	1	0	0	0	0	1	0	1	0	2	0	1	8	0	0
M	0	0	0	1	0	0	1	0	1	1	0	4	1	0	0	1	4	1	1	0	0	1
NM	0	2	3	1	2	4	3	4	3	2	6	0	1	4	2	1	1	2	0	0	2	3
NPM	2	1	3	2	2	3	5	3	6	2	3	2	2	0	0	0	0	1	0	0	3	2
NPKM	3	1	6	0	1	3	6	1	7	3	3	3	2	0	0	2	1	2	1	0	7	4

Note: (1) OTU1: GI:KR066494, OTU2: GI:KR066516/KR066496/KR066518/KR066499, OTU3: GI:KR066500, OTU4: GI: KR066506, OTU5: GI: KT329434, OTU6: GI: KR066505/ KT329436/ KT329433/KR066503/KR066502/KT329438, OTU7: GI:KR066515, OTU8: GI:KR066514, OTU9: GI:KR066495, OTU10: GI:KR066508, OTU11: GI:KR066507, OTU12: GI:KR066512, OTU13: GI:KT329437, OTU14: GI:KR066509, OTU15: GI:KR066501, OTU16: GI:KR066504, OTU17: GI:KR0665103, OTU18: GI:KR066497, OTU19: GI:KR066497, OTU20: GI:KR066510, OTU21: GI:KR066511, OTU22: GI:KR066517.

