

Table 9 Comprehensive clustering coefficient of the degree of damage caused by immersion

Grey level	April							May						
	29	32	34	36	37	39	40	83	84	85	86	87	88	89
1	0.050	0.031	0.000	0.054	0.062	0.150	0.051	0.011	0.024	0.029	0.040	0.000	0.013	0.000
2	0.186	0.265	0.239	0.322	0.190	0.245	0.229	0.178	0.280	0.208	0.309	0.333	0.279	0.308
3	0.073	0.028	0.122	0.022	0.204	0.168	0.587	0.090	0.011	0.113	0.230	0.530	0.044	0.053
4	0.580	0.214	0.394	0.415	0.537	0.435	0.133	0.556	0.401	0.614	0.421	0.129	0.552	0.413

Grey level	June						July		
	33	36	38	41	42	87	84	38	42
1	0.013	0.000	0.059	0.038	0.079	0.000	0.016	0.066	0.053
2	0.321	0.331	0.312	0.327	0.343	0.351	0.270	0.331	0.372
3	0.027	0.029	0.176	0.266	0.436	0.513	0.076	0.168	0.420
4	0.389	0.452	0.435	0.368	0.005	0.101	0.437	0.435	0.018

Table 10 Results of grey clustering evaluation of the degree of damage caused by immersion

Point	April							May						
	29	32	34	36	37	39	40	83	84	85	86	87	88	89
Degree of immersion	serious	mild	serious	serious	serious	serious	moderate	serious	serious	serious	serious	moderate	serious	serious

Point	June						July		
	33	36	38	41	42	87	84	38	42
Degree of immersion	serious	serious	serious	serious	moderate	moderate	serious	serious	moderate

On the basis of the evaluation results, ubiquitous damage can be observed in the study area (see Table 10), with 17 observation points under the serious immersion category, 5 under the moderate immersion category, and 1 under the mild immersion category. Therefore, the more immersion areas are categorized as serious immersion and are not suitable for crop cultivation.

Conclusions

In this study, the soil physical properties and other factors affecting crop growth were incorporated into the immersion damage evaluation index, and an evaluation system of the immersion damage was established. Simultaneously, the degree of damage caused by immersion was classified according to grey clustering evaluation based on the triangular whitening weight function. The weight function was constructed to calculate the degree of damage caused by the immersion of the observation point location. The conclusions drawn are as follows:

(1) Crop yields are closely related to soil physical properties, and incorporating it into the immersion evaluation system can render the evaluation results more scientific;

(2) The results indicate that the study area is seriously damaged by immersion; as such, the area is not conducive to crop growth;

(3) This study only observed the typical section and not the entire immersion area because of the agricultural period during the experiment. In the latter part of the study, this evaluation method could be applied in the entire immersion area, providing a basis for reasonable cultivation in the immersion area.

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