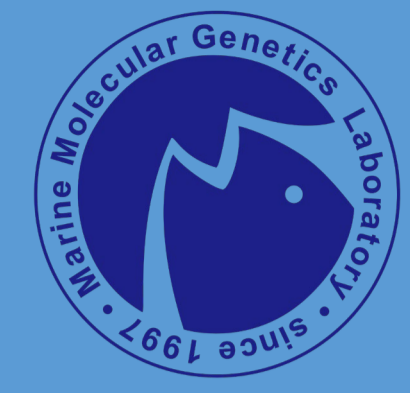


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Introduction

Olive flounder (*Paralichthys olivaceus*) is an economically important aquaculture species in South Korea. However, severe parasitic disease leads to a significant production decrease in olive flounder farms due to their high mortality rate. Regular disease monitoring will profit from studying infection dynamics of pathogens, quarantining the diseased fish by early detection, and pre-treatment of therapeutics. This study will be a milestone in disease prevention and improving olive flounder production.

Table 1. The production and product amount of olive flounder in Jeju Island. Source : Statistics Korea

	2022	2023
Production (ton)	23,000	21,000
Product (billion won)	330	328

Materials and Method

Monthly monitoring of olive flounder farms on Jeju Island in 2023 revealed parasitic infections through microscopic examination of symptomatic fish tissues.

- Monthly monitoring of ten olive flounder fish farms on Jeju Island was conducted from February to November 2023.
- Fish showing external symptoms such as skin darkening, emaciation, and ulceration were sampled and transported.
- Tissue samples from the gills, skin, fins, intestines, and urinary bladder were collected and mounted on slide glasses.
- Parasites were detected through microscopic examination of the prepared tissue samples.

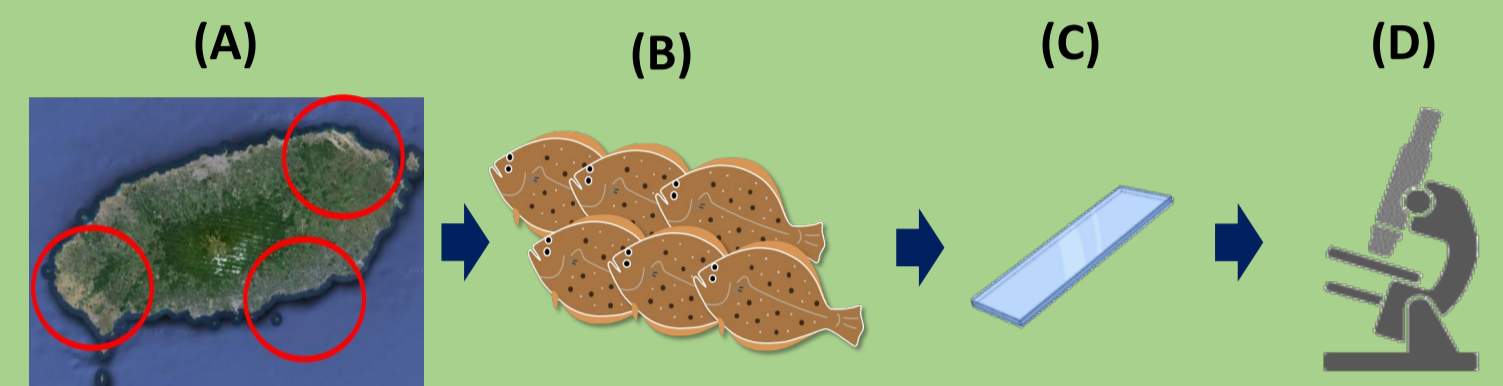


Fig 1. Disease Monitoring Flowchart. (A) Ten fish farms were selected across Jeju Island. (B, C) Tissues from gills, skin, fins, intestines, and urinary bladder were sampled. (D) Parasites were identified microscopically.

Results

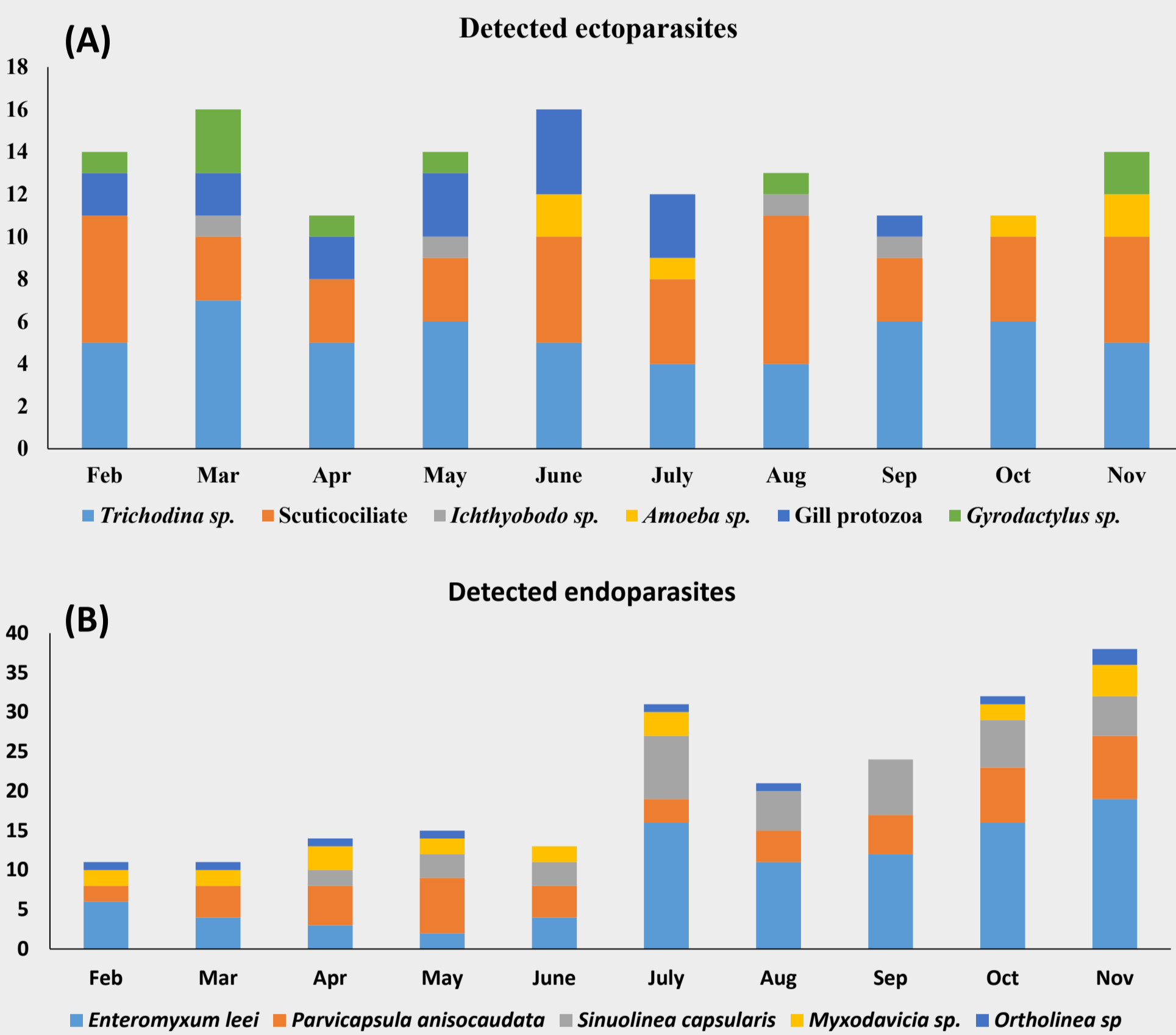


Fig 2. Total detected (A) ectoparasites and (B) endoparasites in the Jeju flounder farms.

Table 2. Parasite Detection in Jeju Flounder Farms. (A) Total detected ectoparasites and (B) total detected endoparasites in Jeju flounder farms.

(A)	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Total
<i>Trichodina sp.</i>	5	7	5	6	5	4	4	6	6	5	53
Scuticociliate	6	3	3	3	5	4	7	3	4	5	43
<i>Ichthyobodo sp.</i>	-	1	-	1	-	-	1	1	-	-	4
<i>Amoeba sp.</i>	-	-	-	-	2	1	-	-	1	2	6
Gill protozoa	2	2	2	3	4	3	-	1	-	-	17
<i>Gyrodactylus sp.</i>	1	3	1	1	-	-	1	-	-	2	9
Detected ectoparasites	14	16	11	14	16	12	13	11	11	14	132

(B)	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Total
<i>Enteromyxum leei</i>	6	4	3	2	4	16	11	12	16	19	93
<i>Parvicapsula anisocaudata</i>	2	4	5	7	4	3	4	5	7	8	49
<i>Sinuolinea capsularis</i>	-	-	2	3	3	8	5	7	6	5	39
<i>Myxodavicia sp.</i>	2	2	3	2	2	3	-	-	2	4	20
<i>Ortholinea sp.</i>	1	1	1	1	-	1	1	-	1	2	9
Detected endoparasites	11	11	14	15	13	31	21	24	32	38	210

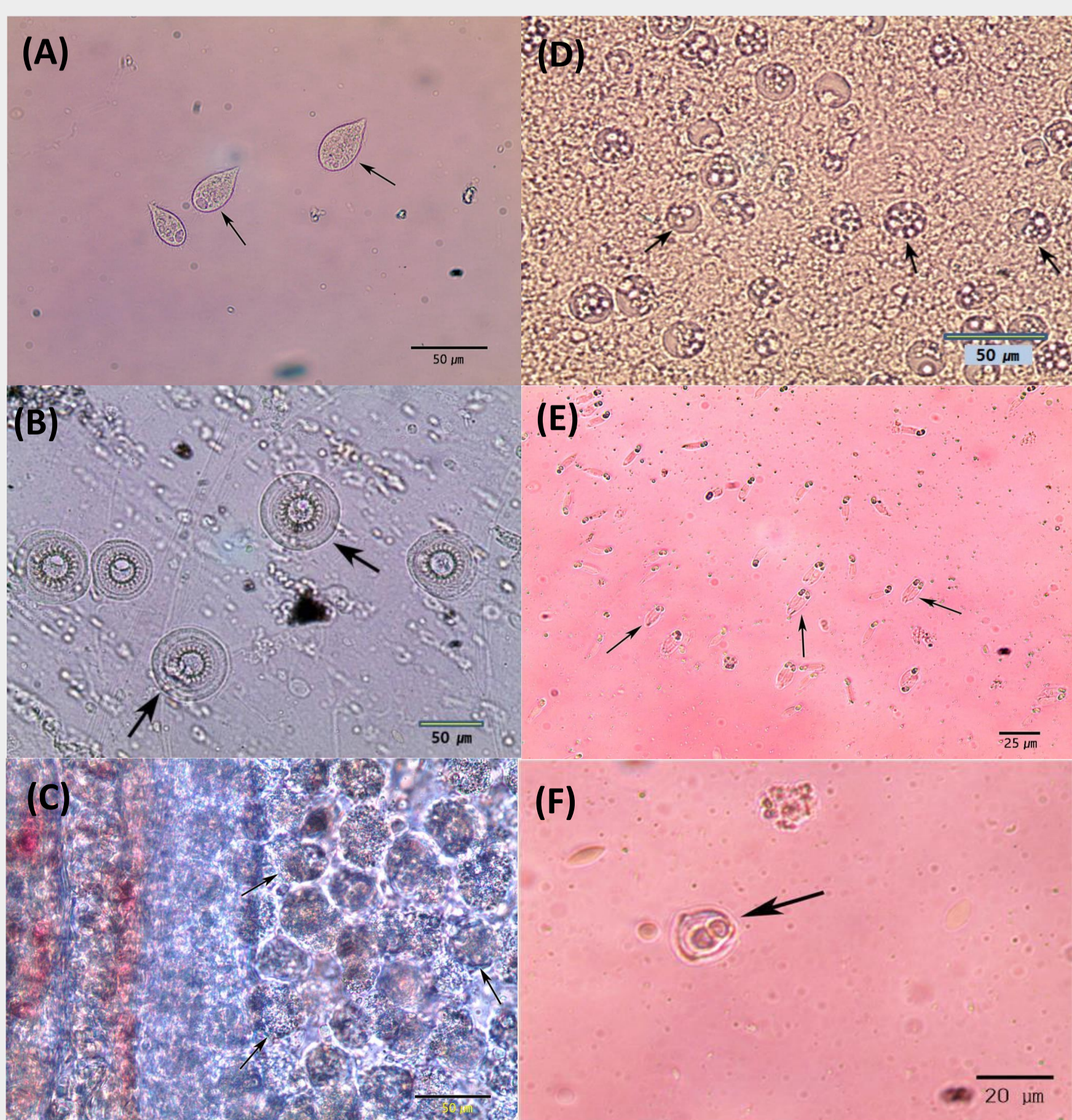


Fig 3. Detected parasites by light microscope. (A) Scuticociliate (B) *Trichodia sp.* (C) Gill protozoa (D) *E. leei* (E) *P. anisocaudata* (F) *S. capsularis*

From February to November 2023, 342 cases of external and internal parasites were recorded through the monitoring. Scuticociliate, *Trichodina sp.*, gill protozoa and *E. leei*, *P. anisocaudata*, *S. capsularis* were ubiquitously detected monthly. Trichodinosis occurred monthly but it can be prevented by managing farm environment. Juvenile fish tended to be infected by Scuticociliate after 2 to 3 months from being transported to the farm. The infected fish showed ulceration and necrosis symptoms in the gill, fin, and skin tissues. *E. leei*-infected fish suffered loss of appetite and energy, causing mass mortality with bacterial infection. *E. leei* had been observed from September to December and its detection decreased gradually from September to March. However, it was continuously detected from April to August during the monitoring.

Conclusion

- A total of 132 cases of ectoparasites and 210 cases of endoparasites were detected in the monitored olive flounder farms on Jeju Island.
- Scuticociliates and *E. leei* were consistently detected every month.
- Regular monitoring is crucial for developing effective disease prevention strategies.
- Isolation and mass cultivation of parasites are necessary for future research, including vaccine development and immunological studies.