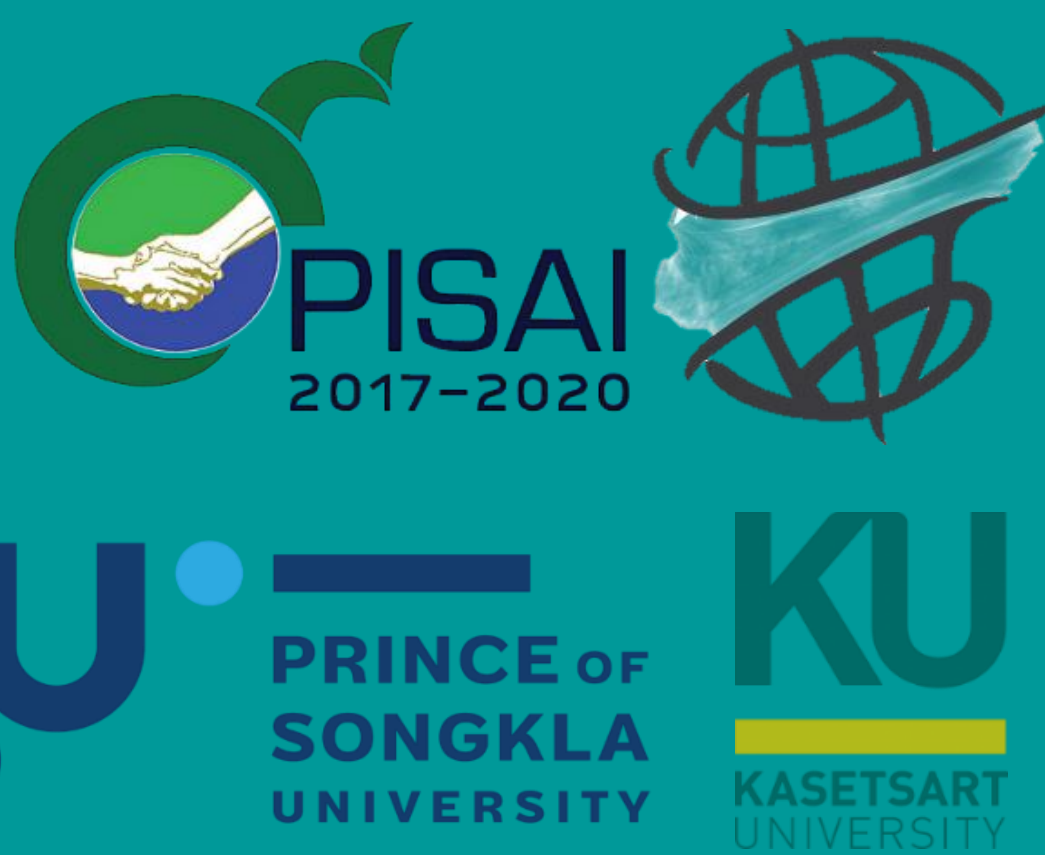


# Effects of horizontal distance and moisture content on the infectious ability of indigenous entomopathogenic nematodes, *Steinernema hermaphroditum* EPNKU60 and *Heterorhabditis indica* EPNKU82 collected from Thailand



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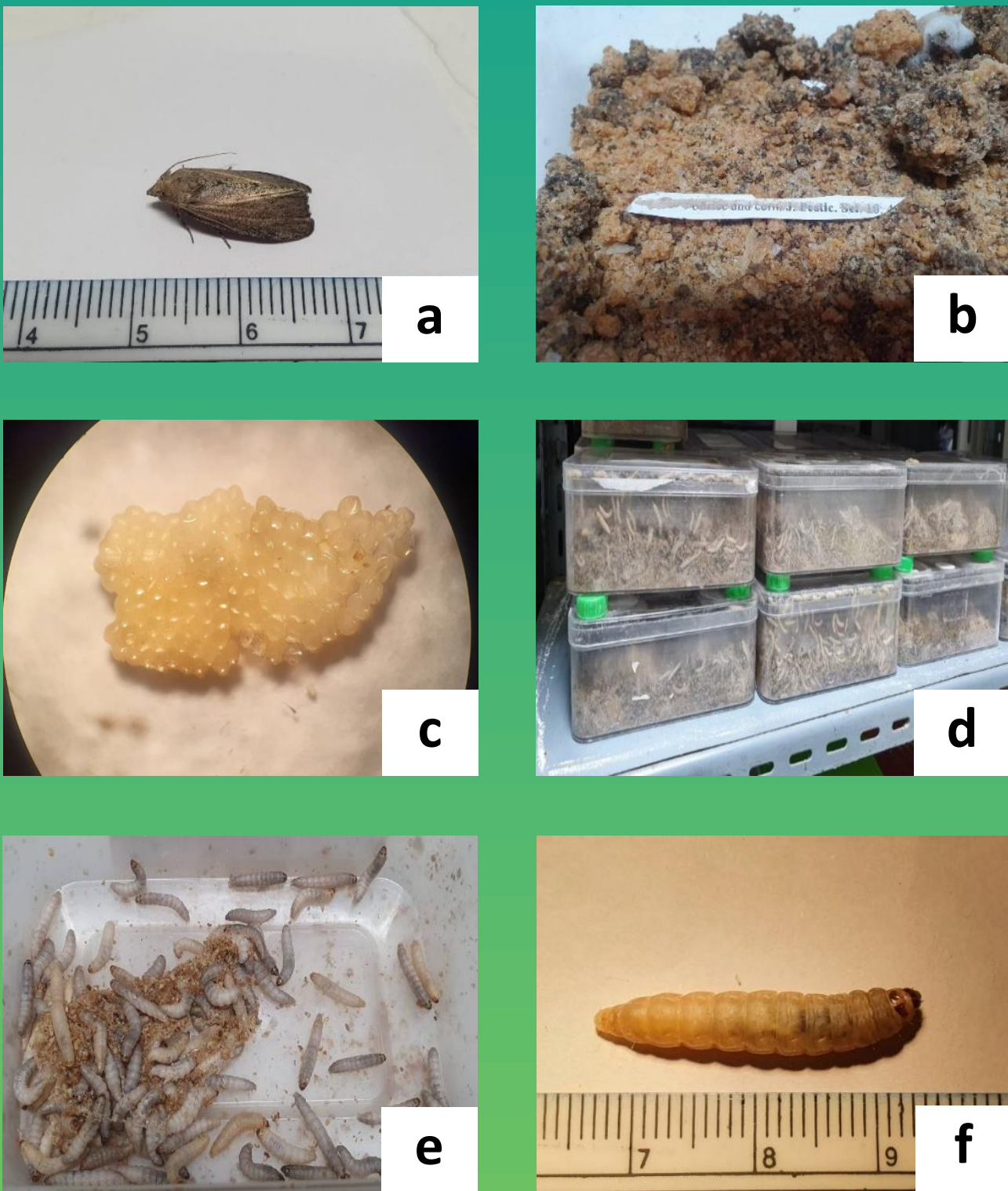
## Introduction and Aims

Entomopathogenic nematodes (EPNs) in the genera *Steinernema* and *Heterorhabditis*, and their symbiotic bacteria (*Xenorhabdus* spp. and *Photorhabdus* spp., respectively) are lethal endoparasites of soil-borne insects. They have been used to control a wide variety of insect pests throughout the world. However, nematode ecology typically affects the ability of nematode infection. The purpose of this study is to determine the effect of horizontal distance and moisture content on the infectious potential of two indigenous EPNs from Thailand, *Steinernema hermaphroditum* EPNKU60 and *Heterorhabditis indica* EPNKU82.

## Materials and Methods

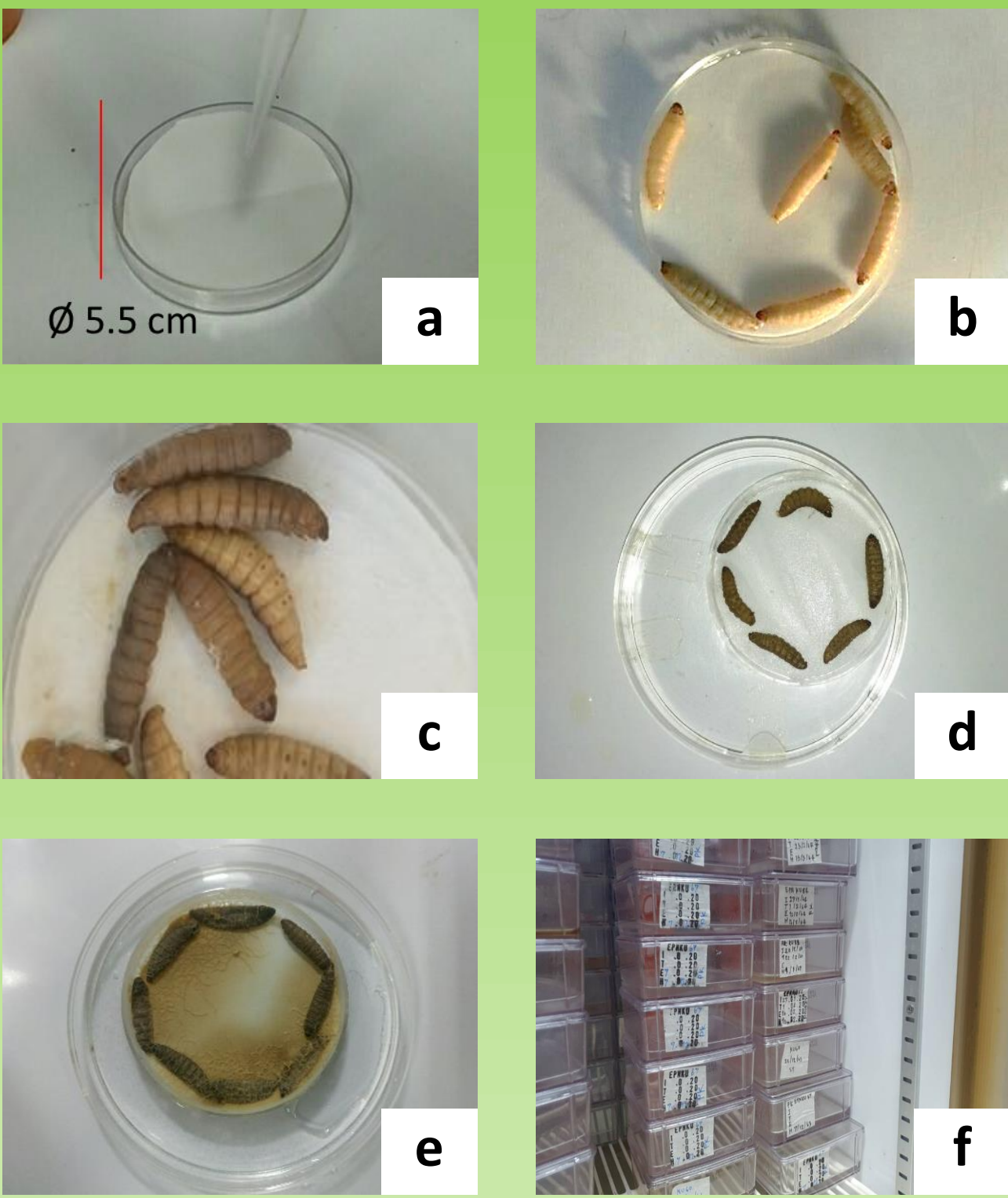
### EPN preparations

#### • *Galleria mellonella* L. rearing



**Figure 1** An adult of *G. mellonella* (a), A piece of paper containing eggs of *G. mellonella* on artificial diet (b), Eggs of *G. mellonella* under 2X magnification of stereo microscope (c), *G. mellonella* rearing in laboratory (d), Last instar larva of *G. mellonella* for nematode rearing (e-f)

#### • EPNs culture

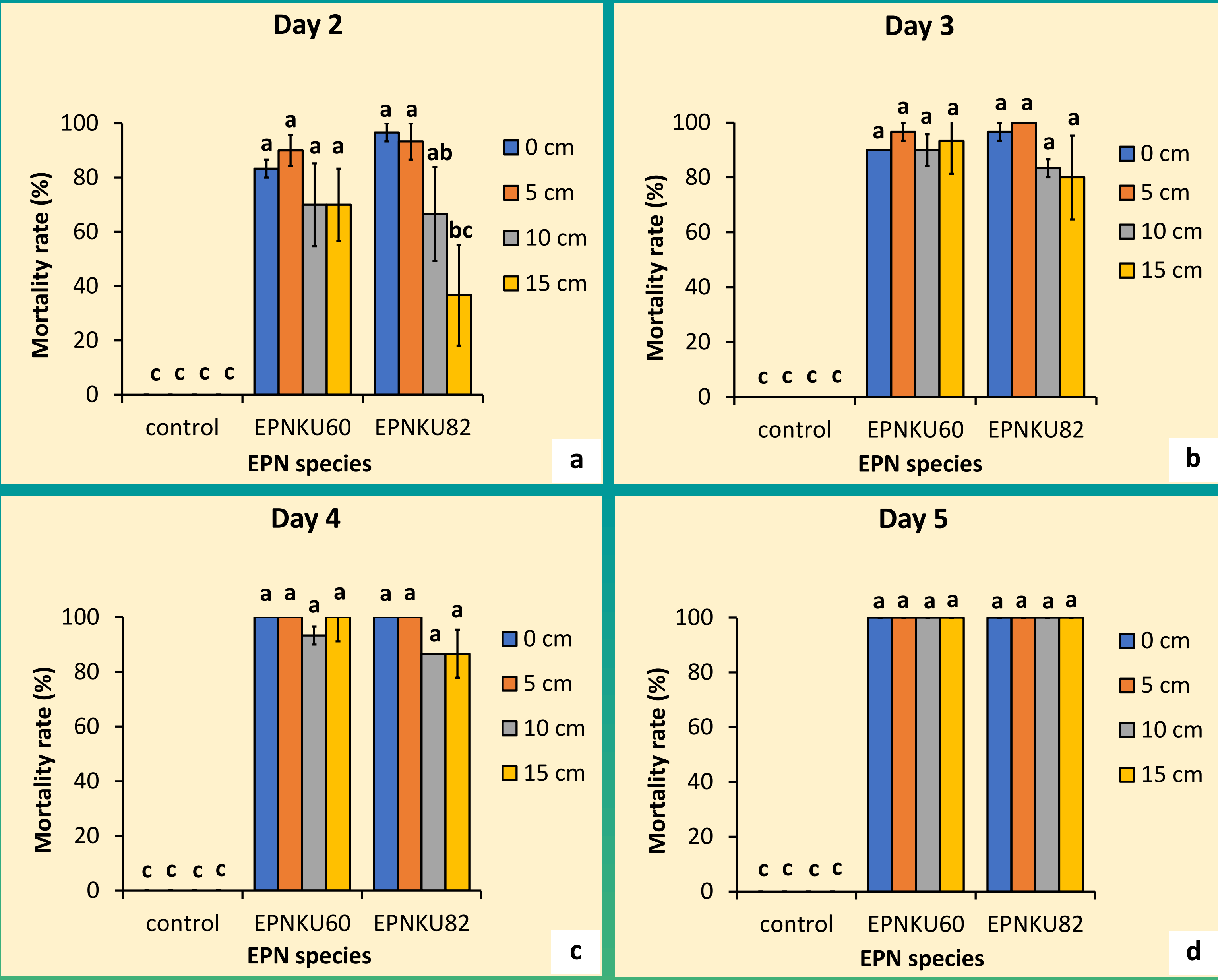


**Figure 2** EPNs suspension applying (a), *G. mellonella* larvae for EPNs culture (b), Infected larvae (c), A modified White trap (White, 1972) (d), Infective juveniles emerging from the cadaver (e), EPNs suspension (f)

## Conclusion

- The two EPNs were able to move horizontally and infect the insect larvae from 0 to 15 cm within 2 days.
- The two EPNs were effective to infect the insect larvae when applied in the soils at 30% moisture content. However, 40-50% infection rates were found when applied in the soils at 20% moisture content.

## Results

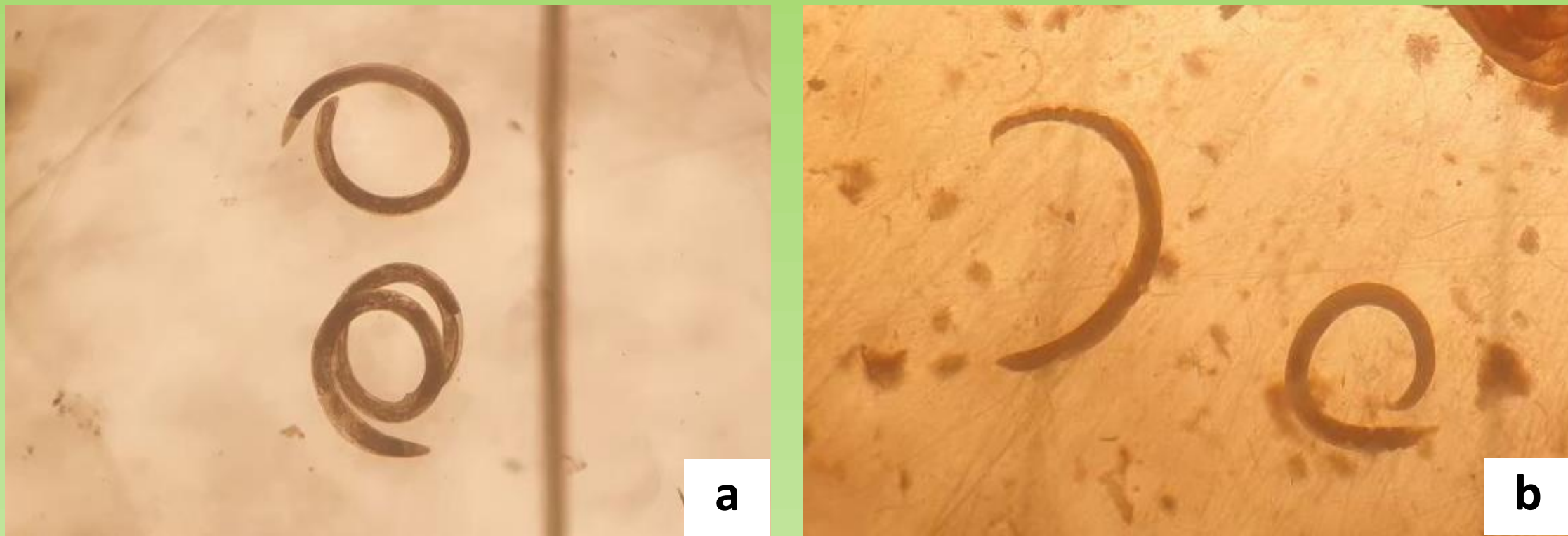


**Figure 5** Mortality rates ( $\pm$ SE) of the last instar larvae of *Galleria mellonella* caused by the invasion of *Steinernema hermaphroditum* EPNKU60 and *Heterorhabditis indica* EPNKU82 at the distances of 0, 5, 10 and 15 cm at 5 days after application.

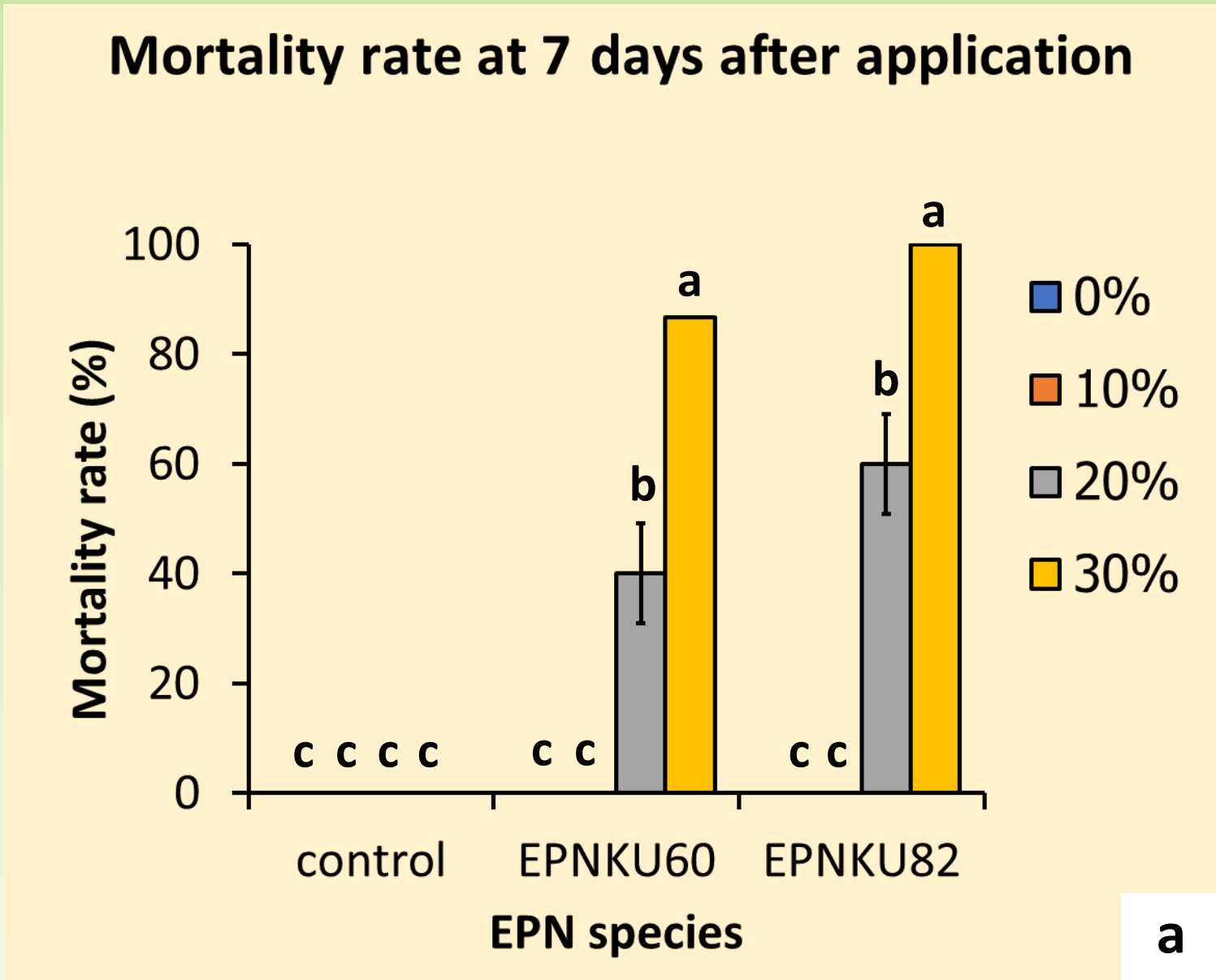
**Table 1** Numbers of nematode ( $\pm$ SE) found in the insect cadaver caused by the invasion of *Steinernema hermaphroditum* EPNKU60 and *Heterorhabditis indica* EPNKU82 at the distances of 0, 5, 10 and 15 cm at 5 days after application.

EPN species	Distance s (cm)	Number of infected cadaver (%)	Number of EPNs (lower-upper)	Number of EPNs inside cadaver
Control		NA	NA	NA
<i>Steinernema hermaphroditum</i> EPNKU60	0	100	(10-84)	31.16 $\pm$ 3.41a <sup>1/</sup>
	5	100	(13-118)	35.83 $\pm$ 5.02a
	10	100	(10-90)	34.06 $\pm$ 3.94a
	15	100	(5-69)	24.60 $\pm$ 2.88a
<i>Heterorhabditis indica</i> EPNKU82	0	100	(13-73)	34.86 $\pm$ 2.74a
	5	100	(16-51)	30.30 $\pm$ 1.64ab
	10	100	(12-45)	26.06 $\pm$ 1.54b
	15	100	(6-34)	18.83 $\pm$ 1.30c

<sup>1/</sup>(Means $\pm$ SE) followed by different lowercase letters in the same column differs statistically at  $P < 0.05$ , as determined by Tukey's test. NA= Not Available data



**Figure 6** *Steinernema hermaphroditum* EPNKU60 inside cadavers (a), *Heterorhabditis indica* EPNKU82 inside cadavers (b)



**Figure 7** Mortality rates ( $\pm$ SE) of the last instar larvae of *Galleria mellonella* caused by the invasion of *Steinernema hermaphroditum* EPNKU60 and *Heterorhabditis indica* EPNKU82 at the moisture content of 0 %, 10%, 20% and 30% at 7 days after application.