The development of *Phytoseiulus persimilis* Athias-Henriot and the effectiveness of it as a predator of *Tetranychus urticae* (Koch) were studied at constant temperatures of 15°, 18°, 21°, 24° and 27° C (humidity fluctuations from 60 % to 90 % R.H.) and at constant humidities of 40 % and 80 % R.H. at the temperatures 21° and 27°. Optimal temperature for time of development was 27° (at 60 %–85 % R.H.). A high reduction in egg vitality was recorded at 40 % R.H. and 27°. At 21° the egg vitality was only slightly lower at 40 % R.H. than at 80 % R.H. The predator gave control of *T. urticae* at temperatures from 15° to 27° (humidity fluctuation from 60 %–90 % R.H.) and the most rapid and efficient control was obtained at 27° (60 %–85 % R.H.). The predator did not give sufficient control of *T. urticae* at 27° and 40 % R.H. At 21° control of *T. urticae* was obtained at both 40 % and 80 % R.H., but the prey population was reduced faster at 80 % R.H. than at 40 % R.H.

A survey of the practical results from using *Phytoseiulus persimilis* Athias-Henriot to control *Tetranychus urticae* (Koch) on cucumber and tomato in greenhouses has shown a great variation in the control achieved, and some cases of economic damage have occurred (Stenseth, 1978). Late introduction of the predator or inadequate application of it by the grower seemed to be the common cause, but could not always account for the bad control results. The climate in the greenhouses is also a factor to be considered.

Bravenboer & Dosse (1962) and Böhm (1970) have studied the effect of temperature on the development of *P. persimilis*, reproduction capacity and number of prey consumed. Mori & Chant (1966a, 1966b) studied aspects of humidity on activity and predacious behaviour. Force (1967) has described experiments to determine the effectiveness of *P. persimilis* to control *T. urticae* at different temperatures.

The study reported here was undertaken to learn more about the effect of temperature and humidity on the development of *P. persimilis* and on the ability of *P. persimilis* to regulate populations of *T. urticae*. 
STENSETH

MATERIALS AND METHODS

STOCK CULTURE

An OP-resistant strain of *P. persimilis* (obtained from Proefstation voor de groenten-en fruitteelt onder glas, Naaldwijk, Nederland) was reared on bean plants (*Phaseolus vulgaris* L. var. *nanus* Asch. cult. “Saxona”) infested with *T. urticae*, in a plant-growth chamber. The temperature fluctuated from 22° to 25°C and the relative humidity varied from 60 % to 90 %. The population of *P. persimilis* was treated with 3 g a. i. sulfotep pr. 100 m³ every fortnight.

EXPERIMENTS

The effect of relative humidity (R.H.) was investigated in controlled temperature/humidity chambers at 80 % (+ 2 %) R.H. with the temperatures 21° and 27°C, respectively, and 40 % (+ 3 %) R.H. for 21° and 27°C, respectively. The light intensity was 8 000 lux and the photoperiod was set at 16 h.

The effect of temperature was investigated in temperature chambers at 15° (R.H., 65 %-90 %), 18° (R.H., 60 %-90 %), 21° (R.H., 60 %-90 %), 24° (R.H., 60 %-85 %) and 27°C (R.H., 60 %-85 %), with natural daylight from April to October. The temperatures fluctuated less than 1°C.

Development of pre-adult stages

The development of *P. persimilis* took place on bean plants infested with *T. urticae* (all stages). At each temperature or humidity/temperature combination 10 plants were used, and each plant initially supported 30 to 50 eggs of *P. persimilis*.

The numbers of hatched eggs and of nymphs maturing to adults were recorded daily.

Effectiveness of *P. persimilis* on populations of *T. urticae*

Two different infestation methods were used.

Method 1: Predator (adults): prey (adults), 1:10. Bean plants were infested with 3 adults (newly after last moult) of *P. persimilis* and 30 adults of *T. urticae* on each plant.

Method 2: Predator (eggs): prey (adults), 1:10. Bean plants were infested with 5 eggs of *P. persimilis* and 50 adults of *T. urticae*.

In the temperature experiments both methods were used, and in humidity/temperature experiments only method 1.

Each infestation method was repeated twice. A sample of 6 plants was taken every 4-7 days. Totals for eggs, nymphs and adults of each species were recorded.

RESULTS

DEVELOPMENT OF PRE-ADULT STAGES

The average time for egg development varied from about 7 days at 15° to 2.5 days at 27°, while the time for total development varied from 19 days at 15° to 7 days at 27° (fig. 1). Temperature changes from 27° to 21° only slightly effected development times, but those from 21° to 15° more distinctly prolonged development.