CLIMATE SENSITIVE DISEASES IN VIETNAM: AFLATOXIN B$_1$ IN MAIZE AND ZOONOTIC DISEASES IN PIGS

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INTRODUCTION

Vietnam is a tropical country with high temperatures and precipitation which may provide good conditions for climate sensitive diseases. Limited studies have been conducted to evaluate the level of aflatoxin B$_1$ in maize and zoonotic diseases in pigs in Vietnam. In addition, no previous studies have been conducted to evaluate the perception and knowledge of aflatoxins in Vietnam. Therefore, the main objective of this study was to determine the prevalence of aflatoxin B$_1$ in maize and two zoonotic diseases (Japanese encephalitis and leptospirosis) in pigs, as well as to evaluate perceptions and knowledge of aflatoxins among people in the study areas.

RESEARCH APPROACH

Maize and pig samples were randomly collected from six provinces based on high maize production to represent six agro-ecological zones : Son La, Hanoi, Nghe An, Dak Lak, Dong Nai, and An Giang. Samples per province were collected using multi-stage sampling (province-district-commune) (Figure 1). Maize was tested for aflatoxin B$_1$ with ELISA and calculated the mean, median and range while pig samples were tested for JE and leptospirosis with ELIS to estimate the sero-prevalences. All maize and pigs samples were analyzed at Plant Protection Research Institute (PPRI) and National Institute of Veterinary Research (NIVR), respectively.
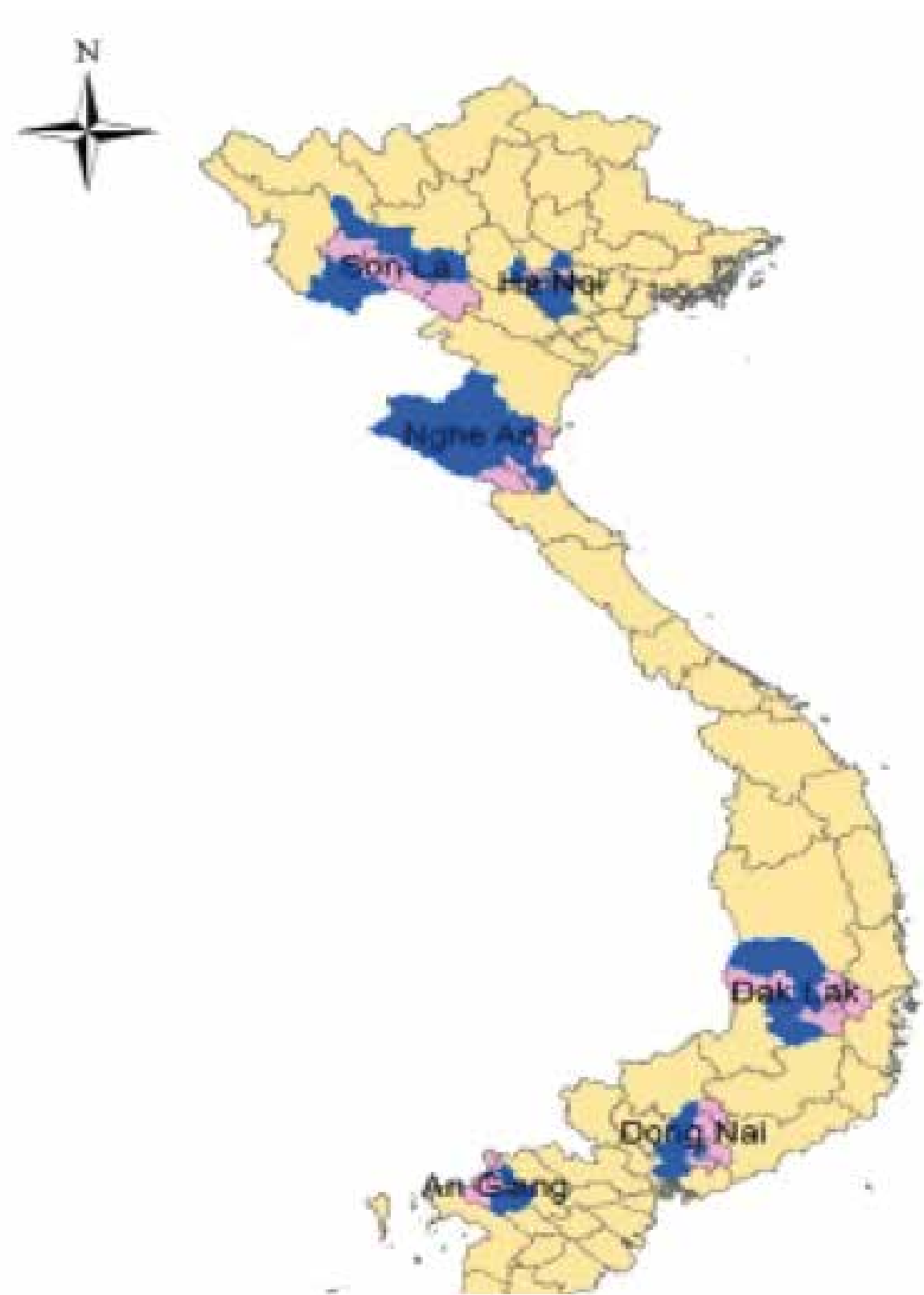
RESULTS

A total of 2,370 maize samples were collected from six provinces and analyzed. Among collected samples, 799 samples (33.71%, 95% CI: 31.81%-35.66%) were above 5 µg/kg, and 687 samples (28.98%, 95% CI: 27.17%-30.86%) were above 20 µg/kg (Table 1). A total of 1,959 sera samples were collected from five provinces and analyzed. Overall, the sero-prevalences of leptospirosis were 8.17% (95% CI: 6.99-9.47) and serovar Tarassovi Mitis (2.19%) had the highest prevalence followed by Australis (1.94%), Javanica (1.68%) and Autumnalis (1.17%) using a cutoff titer of ≥ 1:100 (Figure 2) while 3.98% (95% CI: 3.16-4.95) for JE was detected (Table 2).

DISCUSSION AND CONCLUSION

This is the first large scale screening study for Aflatoxin B$_1$ in maize and leptospirosis and JE in pigs in Vietnam and the results are useful to better understand the level and epidemiology of aflatoxins, Japanese encephalitis and leptospirosis in different provinces. This study also suggests potential risk to humans and animals in Vietnam as well as to identify demographic factors (such as gender and level of education) significantly influencing knowledge of aflatoxins. Further investigation is needed in each region into the possible role of environmental conditions and different wildlife species in contributing to infection.

Figure 1: Sampling districts(pink) within selected provinces (blue)

Province	Purpose (No)*	No. with aflatoxin level >2 µg /kg (% with 95% CI)	No. with aflatoxin level >5 µg /kg (% with 95% CI)	Mean	Median	Range
Hanoi	Human consumption (12)	3 (25.0%, 5.5-57.2)	3 (25.0%, 5.5-57.2)	2.7	0.5	0-13.2
	Animal feed (383)	181 (47.3%, 42.2-52.4)	160 (41.8%, 36.8-46.9)	6.8	1.0	0-34.8
Son La	Human consumption (0)					
	Animal feed (394)	230 (58.4%, 53.3-63.3)	203 (51.5%, 46.5-56.5)	7.8	5.9	0-22.0
Nghe An	Human consumption (3)	1 (33.3%, 0.8-90.6)	1 (33.3%, 0.8-90.6)	3.9	0.6	0.1-11.0
	Animal feed (390)	111 (28.5%, 24.0-33.2)	86 (22.1%, 18.0-26.5)	4.0	0.2	0-30.0
Dak Lak	Human consumption (185)	8 (4.3%, 1.9-8.3)	8 (4.3%, 1.9-8.3)	0.7	0.2	0-16.0
	Animal feed (195)	6 (3.1%, 1.1-6.6)	5 (2.6%, 0.8-5.9)	0.6	0.2	0-19.3
Dong Nai	Human consumption (194)	86 (44.3%, 37.2-51.6)	68 (35.1%, 28.4-42.2)	6.1	1.1	0-20.9
	Animal feed (201)	103 (51.2%, 44.1-58.3)	89 (44.3%, 37.3-51.4)	6.7	2.2	0-22.0
An Giang	Human consumption (131)	43 (32.8%, 24.9-41.6)	41 (31.1%, 23.3-39.7)	3.9	0	0-21.8
	Animal feed (266)	27 (10.2%, 6.8-14.4)	23 (8.6%, 5.6-12.7)	1.3	0.1	0-23.8

* A total of 16 samples were excluded from calculation because of showing below the detection limits (<0.02 µg/kg): Hanoi (2), Son La (1), Nghe An (1), Dak Lak (9) and An Giang (3)

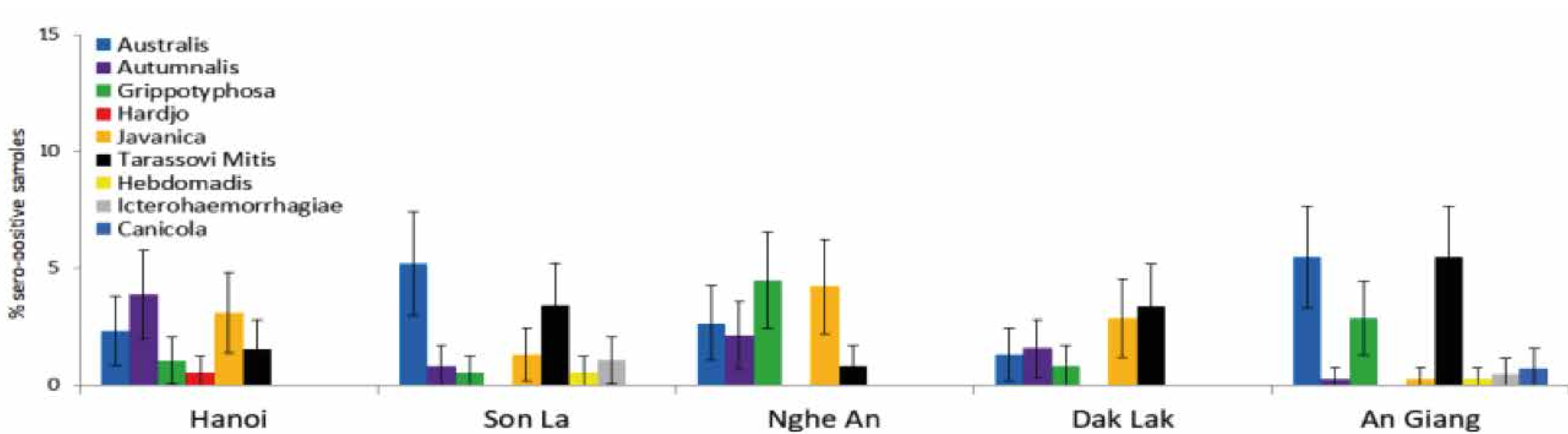Table 1: Distribution of aflatoxin B1 level in maize from province by purpose

Figure 2: Percentage with 95% confidence interval of sero-positive samples by serovar in each province using cutoff titer ≥ 1:100

Province (No.)	Positive samples (% with 95% CI)	Suspected samples (% with 95% CI)
Hanoi (389)	47 (12.08, 95% CI: 9.01-15.74)	34 (8.74, 95% CI: 6.12-12.00)
Son La (384)	11 (2.86, 95% CI: 1.44-5.07)	5 (1.30, 95% CI: 0.4-3.01)
Nghe An (380)	12 (3.16, 95% CI: 1.64-5.45)	9 (2.37, 95% CI: 1.09-4.45)
Dak Lak (385)	6 (1.56, 95% CI: 0.57-3.36)	9 (2.34, 95% CI: 1.07-4.39)
An Giang (420)	2 (0.48, 95% CI 0.06-1.71)	4 (0.95, 95% CI 0.26-2.42)
Total (1,958)	78 (3.98, 95% CI: 3.16-4.95)	59 (3.01, 95% CI: 2.30-3.87)

Table 2: Seroprevalence of JE in pigs from five provinces in Vietnam