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Effect of Estrogen and Progeterone on seed germination

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Abstract

Early pregnancy detection in dairy cattle is an integral part of a successful animal husbandry practice. A simple seed germination technique (Punyakoti test) comprises observation of differential seed germination response of wheat seeds to diluted fresh urine samples as reflected by significant inhibition of germination percentage in pregnant cow urine when compared to non pregnant cow urine. Hormone metabolites excreted through urine might affect the seed germination in pregnant cow urine. In the present study an attempt was made to test the effect of hormones (in their natural forms) at different concentrations of estrogen (17-ß estradiol) and progesterone on wheat and green gram germination. Stock solutions of estrogen and progesterone were prepared in alcohol (1mg/ml) and serial dilutions made using distilled water to get the concentrations of T1=10, T2=1, T3=0.1 and T4=0.01 µg/ml respectively in treatment groups. About 15 seeds each of wheat and green gram were taken in sterile Petri dishes into which 15ml of each test preparation was poured. The treatments were compared with distilled water and alcohol controls. The study was conducted for a period of five days during which seed germination was observed after 48 hrs and shoot lengths were also measured by the end of study. The average seed germination and shoot length in treatment groups did not vary significantly (P>0.05) when compared with that of control groups. Thus from the present study, it can be concluded that estrogen and progesterone in their natural form will not affect seed germination and shoot length.

Keywords: Estrogen, Progesterone, Seed Germination, Pregnancy, Dairy Cattle.

Introduction

The Indian society is basically rural in character as nearly 2/3rd of the population lives in villages. By and large the Indian economy is also dependent upon agriculture and allied sectors like animal husbandry. India harbors cattle population of 204.58, Buffalo-84.21, Sheep-50.8, Goat-115 millions. Early pregnancy detection in dairy cattle is an integral part of a successful animal husbandry practice. Some of the commonly used techniques in pregnancy detection include physical (rectal palpation, radiography, laparoscopy and ultra sonography), chemical (cuboni's test), biochemical (assay of hormones and pregnancy specific proteins by radio immunoassay), immunological (rosette inhibition test for early pregnancy factor) (Wani *et al*., 2003). A simple seed germination technique (Punyakoti test) comprises observation of differential seed germination response of wheat seeds to diluted fresh urine samples as reflected by significant inhibition of germination percentage in pregnant cow urine when compared to non pregnant cow urine. This technique requires tools that are in expensive and readily available in the house of a common farmer and does not demand any special skills. In the present study an attempt was made to test the effect of hormones (in their natural forms) at different concentrations of estrogen (17-ß estradiol) and progesterone on wheat and green gram germination.

Material and Methods

The seed germination technique to know the effect of estrogen and progesterone on seed germination was performed as per the details explained by Veena and Narendranath (1993). This technique comprised subjecting wheat and green gram seeds to germination with freshly prepared estrogen and progesterone solutions. Stock solutions of estrogen (17-ß estradiol) and progesterone were prepared in alcohol (1mg/ml) and serial dilutions were made using distilled water to get the concentrations of T1=10, T2=1, T3=0.1 and T4=0.01 µg/ml respectively in treatment groups. Wheat seed and green gram seeds were procured locally as representatives of monocot and dicot.

About 15 seeds each of wheat and green gram were taken and uniformly spread over a single layer

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Table 1. Effect of estrogen and progesterone on average seed germination

Feed	Distilled water E /P	Alcohol E /P	T1 E /P	T2 E /P	T3 E /P	T4 E /P
Green gram	14.78±0.11	15.00±0.0	14.89±0.11	14.56±0.29	14.22±0.29	14.67±0.19
	14.56±0.11	14.78±0.11	14.56±0.44	14.33±0.33	14.78±0.11	14.78±0.22
Wheat	9.55±0.29	9.22±0.94	10.11±0.11	9.55±0.61	9.11±0.11	9.00±1.33
	9.55±0.29	9.66±0.33	9.33±0.50	9.77±0.77	9.88±0.86	9.22±0.94

filter paper bed in sterile Petri dishes into which 15ml of each test preparation was poured. The treatments were compared with distilled water and alcohol controls. The study was conducted for a period of five days during which seed germination was observed after 48 hrs and shoot lengths were also measured by the end of study. The data generated from the experiment was tabulated, the mean and standard error was computed for all the groups. The data thus generated was analyzed by one-way ANOVA with Dunnett's post test using software, Graphpad prism version 4.01.

Results and Discussion

The average seed germination in estrogen treated groups (T1=14.22±0.29, T2=14.56±0.11, T3=14.56±0.44 and T4=14.78±0.11for green gram and T1=9.11±0.11, T2=9.55±0.29, T3=9.33±0.50 and T4=9.88±0.86 for wheat) did not vary significantly (P>0.05) when compared with that of control groups i.e., distilled water=14.78±0.11 and alcohol=14.89±0.11 for green gram and distilled water=9.55±0.29and alcohol=10.11±0.11 for wheat respectively.

The average seed germination in progesterone treated groups were T1=14.67±0.19, T2=14.78 ±0.11, T3=14.33±0.33and T4=14.78±0.22 for green gram and T1=9.00±1.33, T2=9.66±0.33, T3=9.77 ±0.77 and T4=9.22±0.94 for wheat which had no significant (P>0.05) variation when compared with that of control groups i.e., distilled water=15.00±0.0 and alcohol=14.56±0.29 for green gram and distilled water=9.22±0.94 and alcohol=9.55±0.61 for wheat respectively (Table. 1).

The average shoot length in estrogen treated groups (T1=8.74±0.38, T2=8.51±0.40, T3=8.88±0.56 and T4=8.50±0.45 for green gram and T1=7.48±0.31, T2=7.58±0.48, T3=8.54±0.29 and T4=8.33±0.29 for wheat) did not vary significantly (P>0.05) when compared with that of control groups i.e., distilled water=8.88±0.29 and alcohol=8.73±0.30
for green gram and distilled water=8.43±0.21 and alcohol=7.92±0.23 for wheat respectively.

The average shoot length in progesterone treated groups were T1=8.29±0.22, T2=7.92±0.43, T3=8.39±0.28 and T4=8.46±0.32 for green gram and T1=7.63±0.31, T2=8.14±0.28, T3=8.09±0.26and T4=7.99±0.54 for wheat which had no significant (P>0.05) variation when compared with that of control groups i.e., distilled water=8.53±0.30 and alcohol=8.47±0.34 for green gram and distilled water=8.41±0.27 and alcohol=8.21±0.43 for wheat respectively (Table. 2).

In the present study, estrogen and progesterone in their natural forms did not affect either the seed germination or shoot length. But according to the study conducted by Veena and Narendranath (1993), both wheat and green gram seed germination rate is significantly (P<0.01) decreased in diluted pregnant cow urine compared to non pregnant cow urine.

References

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Table 2. Effect of estrogen and progesterone on average shoot length

Feed	Distilled water E /P	Alcohol E /P	T1 E /P	T2 E /P	T3 E /P	T4 E /P
Green gram	8.88±0.29	8.53±0.30	8.73±0.30	8.47±0.34	8.74±0.38	8.29±0.22
	8.51±0.40	7.92±0.43	8.88±0.56	8.39±0.28	8.50±0.45	8.46±0.32
Wheat	8.43±0.21	8.41±0.27	7.92±0.23	8.21±0.43	7.48±0.31	7.63±0.31
	7.58±0.48	8.14±0.28	8.54±0.29	8.09±0.26	8.33±0.29	7.99±0.54

Values are Mean ± SE, n = 15, for all values, P > 0.05