Gene expression in the precocious germination of late maturation *Phaseolus vulgaris* L. seeds.

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1-D	one dimensional
2-D	two dimensional
A_{260}	absorbance at 260nm
ABA	abscisic acid
AU	absorbance unit
AU*mm	absorbance unit times millimetres(a measure of peak area)
cpm	counts per minute
DAA	days after anthesis
DEPC	diethylpyrocarbonate
EDTA	ethylenediaminetetraacetic acid
FW	fresh weight
kb	kilobase
kD	kilodalton
LEA	late embryogenesis abundant(protein)
MOPS	3-[N-Morpholino]propanesulfonic acid
MW	molecular weight
PCR	polymerase chain reaction
pI	isoelectric point
ppm	parts per million
PPO	2,5-diphenyloxazole
SDS	sodium dodecylsulphate
SDS-PAGE	sodium dodecylsulphate polyacrylamide gel electrophoresis
TBE	Tris-borate EDTA
TCA	trichloroacetic acid
TEMED	N,N,N′,N′,-tetramethylethylenediamine
TMV	tobacco mosaic virus

ABSTRACT

Ethylene induces precocious germination in late maturation embryos (32-40 days after anthesis) of *Phaseolus vulgaris* L. cv. Seminole, thus overriding the endogenous controls which normally maintain quiescence. The possibility that ethylene exerts its effects at the gene expression level was investigated by in vitro translation of RNA extracted from embryo axis tissue of seeds induced to germinate precociously by incubation with ethylene. ^{35}S-labelled products so produced were analyzed by electrophoresis, fluorography, and scanning densitometry. Results were compared with normally germinating seeds and with embryos incubated in the absence of ethylene. Ethylene was found to induce a qualitative and quantitative change in gene expression in late maturation embryos detectable within 6 hours of ethylene exposure. Two products (37-38kD and 27kD) were up-regulated within 24 hours in both ethylene-induced precocious germination and normal germination. Four products (71kD, 67-68kD, 65-66kD, and 41-42kD) which appeared in normal germination were evidently not required for ethylene-induced precocious germination. In contrast with the findings of Misra & Bewley (1985;1986) for maize(*Zea mays* L.) no products could be identified as being unique to the developmental phase, however two products (38-39kD and 28kD) were strongly present in development but disappeared shortly after germination. A product of 22-23kD was apparently unique to the ethylene-induced precocious germination treatment and may represent a gene regulated by ethylene. This product was not seen until 24 hours after ethylene introduction. An attempt was made using SDS-PAGE to identify the major storage proteins of *P.vulgaris* to use as markers of the developmental phase, however this was only partially successful. Suggestions are made as to approaches and methods for future research.