# A New Perspective on Water Flow from Soil to Seed: The Role of Vapor. (S01-wuest151803-Oral)

**Authors:**

- S.B.Wuest* - *USDA-ARS, Pendleton, OR*

## Abstract:

It is commonly assumed that flow of liquid water from soil to seed is the major source of water for imbibition. Four different laboratory experiments provide evidence to the contrary, that is, that vapor flow is rapid and can account for at least 85% of imbibed water. 1) Seed separated from soil by a layer of crop residue or an air gap had decreased water absorption in proportion to the seed-soil distance, not in proportion to the amount of seed-soil contact. 2) Seed pressed firmly into soil emerged no sooner than seed at the same depth mixed into a layer of crop residue. 3) Germination of seed, when separated from soil by a layer of fiberglass cloth, was delayed from 5% to a maximum of 20%. 4) Seed suspended in soil atmosphere with no soil contact imbibed 85% of the water imbibed by seed in intimate soil contact during a period of 24 h. The capacity of soil atmosphere to transfer vapor to a dry object across short distances is evidently great enough to account for most or all seed imbibition over a wide range of soil water potentials (-0.15 to -1.1 MPa).

**Corresponding Author Information:**

Stewart Wuest
USDA-ARS,
Pendleton, OR
PO BOX 370
Pendleton, OR 97801

phone: 541 278 4381
fax: 541 278 4372
e-mail:
stewart.wuest@oregonstate.edu

**Presentation Information:**

Presentation Date: Tuesday, November 12, 2002
Presentation Time: 8:45 am

**Keywords:**

vapor transport, seed-soil contact, seed imbibition, germination