Rock around the garden

High-level sound makes turnips sprout faster. It may mean there's even a use for jet noise.

Joseph Jacobs

by Dietrick E. Thomsen

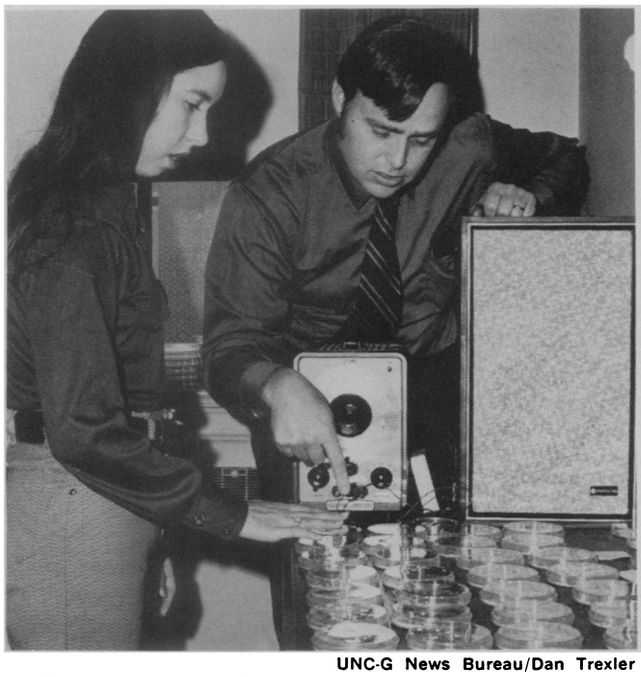
It's an ill wind that blows nobody any good. Trite proverb.

Noise is generally considered a deleterious aspect of the environment. It damages the psychology and physiology of humans and animals. People protest it, try to abate it, and flee to the country to avoid it. In the future the country could become as noisy as the city, and if such a thing should come to pass, it might be, ironically, because four scientists at the University of North Carolina at Greensboro, physicists Gaylord T. Hageseth and Gerald W. Meisner, biologist Ralph M. Morrison, and chemist Irena L. Morrison, have discovered a beneficial effect of noise.

The Greensboro group have found that noise of the sort produced by a 727 jet taking off causes turnip seeds to germinate faster than they otherwise would. The experiments subjected both dry and wet turnip seeds to "pink" noise between 20 and 20,000 hertz frequency and 100 to 110 decibels intensity. Control groups were kept in a relatively quiet (60-decibel) environment. Hageseth describes the experimental noise as about equivalent to standing 100 feet from a 727 standing on the runway.

The noise had no effect on the germination properties of dry seeds. When the seeds were wet, however, the ones exposed to the noise germinated in about 10 percent less time than the ones in the quiet environment. The exposed seeds also showed a germination rate about 100 percent higher than the controls.

Hageseth and Meisner cite two possible ways in which the sound could affect the seeds, one mechanical, one biochemical. The mechanical explanation would have the sound waves shake up



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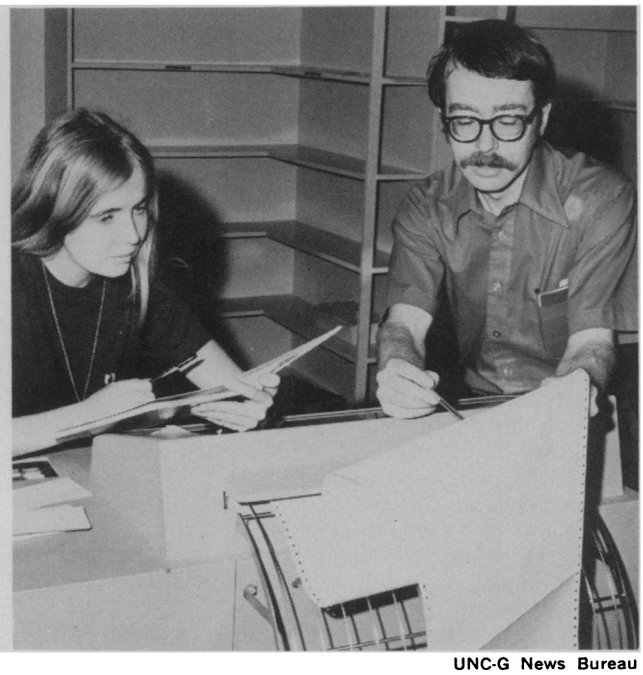

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Hageseth and student Martee Overman discuss bombarding turnip seeds with noise. Meisner checks data run.

the exterior coating of the seed, breaking it down in some way that lets water and oxygen enter more easily and thus promotes the beginnings of growth. The biochemical explanation would have the sound waves affecting the interiors of cells within the seed.

The Greensboro group tends to favor the biochemical explanation, and Richard Whitlock, also of UNCG, has worked out a three-step model of what might be happening. First energy is transferred to standing waves inside the cells of the seed, each standing wave confined by the walls of its cell. The wave inside the cell then excites the cell from its ground state to some excited energetic state that promotes growth and the germination of the seed. The exact details of the activity inside the cell, what organelles or parts of the cell may be particularly involved in the excitation, are not yet clear.

According to Hageseth and Meisner, the U.S. Department of Agriculture is interested in their work, and they spent a day at USDA discussing it with various people there. If the effect occurs with all kinds of seeds, it could have important applications to agriculture. At the recent meeting of the American Physical Society in Washington, the Greensboro physicists cited two of the possibilities.

In hot regions of the earth, the ground temperature is often so high that seeds planted in it go into a state of dormancy. In the San Joaquin Valley of California, for example, ground temperatures around 100 degrees F. induce dormancy in lettuce seeds. If sound irradiation can break that dormancy, it might be possible to get two lettuce crops a season instead of one.

The sound waves might also be used to make weeds germinate before a field is planted. Once they had germinated, the weed seedlings would be vulnerable to destruction by being plowed under. After the plowing the desired crop could be sown in a weed-free field.

Hageseth and Meisner admit that broadcasting airport-level sound over the countryside is not very appealing. Work is going forward to see if particular wavelengths or combinations of wavelengths might produce the desired effect at lower decibel levels. Also important is the minimum duration of noise needed to produce swifter germination: A few minutes of high-decibel noise would not be as annoying to neighbors as several days of it. Another point that must be determined is whether the noise-affected seedlings grow into normal plants.

If all these questions come out favorably, the day may come when farmers will be setting up loudspeakers in their fields to play noise at their crops even as they now put them up in barns to play music to content the cows. □