



New Plateaus of Training Needed for Each Generation

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Grandpa, meeting his cronies in the village store back in the last century, was a community leader. His word on crops and politics was listened to with respect, for grandpa had completed eight full grades of schooling. Even many school teachers had less, back there in the 80's.

Father, in those years before World War I, was a success, a community leader in his day. Father's high school diploma gave him standing in the Chamber of Commerce and in county politics.

Father's biggest wish was that his son might go to college, and that wish was fulfilled. So Father stepped aside in the 1940's and the college-trained son, with his bachelor's degree, gradually took over reins of leadership, in the business and in the community.

So it has been — a higher plateau of learning for each generation, yet each with the same degree of leadership in his generation. Measure it in periods of 25 years — an eighth grade education in 1890, high school in 1915, a bachelor's degree in 1940.

Next Plateau 1965

The next 25-year span carries us up to 1965. The community leader of that era is now in college. Will a bachelor's degree be sufficient? Or must there be an-

Our cover picture shows a graduate student taking his oral examinations, judged "in action" by professors from his own and other departments. Both oral and written examinations are required in graduate exams.

other, higher plateau of learning, as there has been in the past.

We think so. New knowledge in science — in fact a whole new realm of a wide variety of new sciences — makes that so. Chemicals, power, transportation, food production, marketing techniques, synthetic fibers, new industrial uses for agricultural products, new communication techniques — the minds and the education of just a few years ago cannot even conceive of such new vistas of learning.

In your University of Arizona's College of Agriculture we are very much aware of this new plateau of learning, this need for further training if tomorrow's generation is to be equipped for the world it will live in.

Requires Sound Foundation

For those students who look forward to service in the fields of teaching and research, work beyond the four-year course is imperative. Such students should first of all have had an excellent record in their undergraduate work. They should have become well grounded in the basic sciences and show evidence of imagina-

tion and originality to produce new ideas and avenues of approach to unsolved problems. Such a student should be a keen observer and be interested in interpreting what he observes. He should recognize that not everything is known as yet, and that our knowledge in many fields is limited.

Graduate training — training beyond a bachelor's degree — provides opportunity for the student to develop his individual talents in the direction of creative work. His research director suggests a problem for study which is within the student's ability to solve and to complete within a reasonable time. He learns how to plan a scientific investigation, to consult the literature to find out what is already known concerning it, and to apply the experimental and mathematical methods he learned in earlier courses.

Wide Variety of Training

The laboratory work may involve the use of microscope, spectrophotometer, or radioactive techniques. The field work may involve plot studies on crop variety, fertilizer or irrigation trials, the action of different chemicals in weed or insect control, and effects of different feeds on meat or milk quality.

The student is taught to keep systematic records of observations and how to handle the numerical results in order to draw logical conclusions from them. Finally he must write up his work in the form of a thesis, presenting data and conclusions in an orderly manner. This final task is excellent training for the preparation of future articles covering new research findings to be published in the scientific literature.

As in all college work, graduate training can be done most economically in the student's home state, where he pays no tuition. In Arizona, graduate training in a wide variety of agricultural sciences can be attained only in the state's Land Grant College of Agriculture, a part of the University of Arizona. Only there does the student find such a wide offering of courses, such a high competence of instruction. In the UA College of Agriculture there are seven departments in which every staff member from rank of assistant professor upward has a doctor's degree — either Ph.D. or D.V.M.

A Key to the Future

What are the advantages of graduate training? Primarily, the possibility of future advancement in rank and salary, whether in agricultural colleges, experiment stations, industry or agricultural production. The nature of the research work itself, the thrill of making new discoveries to further advance the agricultural economy of our country, are additional attractions.

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Brush Invasion Is Problem On Arizona Ranges

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Southern Arizona ranges have been grazed by cattle since about 1700. At that time Father Kino brought in 700 head to the San Xavier Mission a few miles south of Tucson.

The increase from this herd, as well as from subsequent introductions, provides the backbone for Arizona's cattle industry of today. Grazing—as well as other factors, many of them associated with man's use of an area—affects vegetation. In view of this, and since native vegetation furnishes most of the feed required by Arizona's livestock, it is of interest and value to know something of the changes in the vegetation that have taken place during the period of historic record.

Brush Replaces Grass

A search of the literature, both historical and the result of recent research, indicates that many areas formerly supporting essentially pure stands of grass, today grow little except brush or, at best, an overstory of brush over grass. There seems to have been no conversion from brush to grass. On the other hand, areas that produced little vegetation of any sort as much as 65 years ago, today are growing a good stand of grass. This is clearly

shown in repeat pictures of areas previously photographed in 1892.

Although grazing pressures were heavy 65 years ago, many ranges have been grazed continuously during this entire period. In spite of this, however, the grass stands have improved. This shows without question that our native grasses are adapted to long-continued grazing pressures when ranges are properly managed. On the other hand, studies have shown just as conclusively that maintenance of a good grass stand through exclusion of all livestock will not keep brush from invading grassland areas. Although grazing animals are a factor in aiding the spread of mesquite and other woody species, a number of factors may all play a part in such a change.

Five Important Factors

The principal factors, listed in order of importance, seem to be:

- (1) Cessation of grassland fires that formerly occurred at frequent intervals.
- (2) Livestock grazing that spreads seeds of woody plants and removes much of the fuel that used to carry fires.
- (3) Reduction of competition from grasses as a result of selective grazing.
- (4) An increase in rodents that spread seeds of woody plants.

BELOW—Ranges do improve, if properly managed. At left, United States-Mexico boundary southwest of Bisbee as it looked in 1892; at right, the same spot as it looks in 1957.

New Plateaus of Training

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The possibilities based on training at the bachelor's degree level are definitely limited. Science has greatly advanced in recent decades, supplying new techniques, theories and procedures. The most responsible positions demand men and women with the Ph.D. degree or equivalent. This degree stands for the highest level of intellectual and scientific research attainment and certifies to creative ability on the part of the holder.

The problem of maintaining a supply of adequately trained scientific personnel in agriculture is becoming increasingly acute. This should serve as a challenge to every talented high school and college student in agriculture to select some phase of agricultural science which appeals to him, specialize in it for his life work, and then aim to go to the top!

- (5) Climatic changes that tend to open up grass stands and permit establishment of shrubs.

Chemicals May Curb Brush

It is generally conceded that burning is not a practicable method today of controlling the native mesquites and other woody plants on our southern Arizona ranges. Yet, these plants constitute an ever-present hindrance to full forage production. Control by chemicals, though costly and only partly successful in most instances, seems to be the most effective method available thus far.

