The apparatus is called a soil water picnometer and consists principally of a spring scale having a dial calibrated to show the moisture condition of a soil sample. In practice soil is placed in the cylinder until the scale reads a definite weight. Then water is added to the soil in the cylinder and stirred to remove all entrapped air. The water level is brought to a marked level on the cylinder and the total weight of water plus soil is obtained. The pointer on the scale gives this weight or, if calibrated correctly, it gives directly the percent moisture in the original soil sample. Knowing the permanent wilting percentage of the soil, one can then arrive at a decision as to the need for irrigation.

The accuracy of this instrument will depend upon the removal of all entrapped air in the soil, the constancy of the specific gravity of the soil around 2.60, and the skill of the operator in weighing and bringing the volume of water to a constant level in the cylinder. A more complete description of the soil water picnometer will be published elsewhere when more data is available.

The next question following the decision on the time to irrigate is, "how much"? In general one should apply enough water to bring the soil to the field capacity throughout the root zone of the plant. Any less than this will not be enough and any more than this will only wash the fertilizers away from the roots of the plant.

Irrigation engineers can calculate how many acre inches of water your particular irrigation rig will supply in a given time. The problem then is to regulate the length of the time that water is applied so as to get the correct amount into the soil.

The method of calculating the acre inches of water needed by a soil may be illustrated by using as an example a fine sandy soil having a field capacity of 9 percent, a permanent wilting percentage of 1 percent, and a volume weight of 1.3. The available moisture is 8 percent, and when 75 percent of this has been lost from the soil sufficient irrigation must be used to restore the soil to field capacity. The moisture percentage on an oven-dry basis must be increased 6 percent. This percentage can be readily converted to acre inches by means of the following equation:

$$X = \frac{P \times V \times D}{100}$$

where X is acre inches, P is the oven-dry percentage moisture, V is the volume weight of the soil, and D is the depth in inches to which it is desired to wet the soil. In the above example therefore the acre inches of water needed to wet the top foot of soil to the field capacity is

$$X = \frac{6 \times 1.3 \times 12}{100} = 0.936 \text{ acre inches}.$$ 

Efficient use of irrigation waters depends upon an understanding of the field capacity, the permanent wilting percentage, the time to irrigate and the amount of water to use.

In summary, one should know this about soil moisture:
1. Soil moisture which is available to plants under field conditions extends from the field capacity to the permanent wilting percentage.
2. The soil moisture content between these two constants, or the "available" moisture, varies with soil texture. Sandy soils are lowest in available moisture and therefore require more frequent irrigations. Irrigation is needed less frequently on heavy-textured soils, but it is usually necessary to apply the water more slowly than on sandy soils.
3. Irrigation waters should be applied before the plant permanently wilts.
4. Irrigation waters should be applied in quantities sufficient to wet the soil to the field capacity throughout the root zone of the plants.

**HOW TO MAKE GOOD PHOTOS OF FLOWERS AND PLANTS**

**Pasco Roberts**
*Uncle Pasco's Radio Garden Club*
*Radio Station WSUN St. Petersburg*

You can take good pictures of flowers, trees or plants of all kinds with almost any type of camera from the lowly box camera to the higher price Press Cameras. However, that doesn't mean that you can get just as good a picture with the cheaper camera with a fixed
ROBERTS: PHOTOGRAPHING FLOWERS

Focus and one shutter speed as you can with one equipped with a high speed lens and variable shutter speeds. If you own just a BROWNIE Box camera or even a folding camera costing $25.00 or less, there are a few items that will help you get a better picture. A supplementary lens that is used over your regular lens makes it possible to get much closer to your subject. These supplementary lenses are called PORTRAIT lenses for box cameras or cameras in the lower bracket. For cameras with better lenses and shutters the supplementary lenses are known as PORTRA lenses and come in three powers listed as 1+, 2+ and 3+ and each one allows you to get closer to your subject. The 3+ Portra lens makes it possible to get within 10 inches of your subject. The distances have to be measured accurately from the center of subject to the center of the lens to be in absolutely sharp focus. Then to get better rendering of values or tones in black and white picture you will need a filter, or several filters for better cameras. The most useful filter is the one called the K-2 filter. It is a yellow color special glass or stained gelatin and made to fit over your regular lens, or to fit in a special holder that can be fastened over the lens outer rim. The K-2 filter can even be used with a Box Camera by fastening it on with adhesive tape. This filter can be used with the most popular films found anywhere film is sold, and with it you get better separation of colors like green, yellow, red and blue. When using a filter on a camera with variable shutter speeds, you have to allow more light to enter the lens, as filters cut down according to the depth of coloring. The K-2 filter mentioned takes twice as much exposure. For instance if you are using a shutter speed of 50th of a second . . . by making it 25th of a second with the filter you arrive at the correct exposure. Another way is to move the diaphragm (if you have one) to the next larger opening. If it is a Box Camera you have a slide with three holes with small, medium or large openings and with a few experimental exposures you will soon learn which one to use. A filter like the K-2 also helps to cut down excessive or extremely bright light such as a beach scene or a real bright light colored flower, and usually this filter is just right for this purpose on box cameras or fixed focus cameras.

There are many other filters of different colors and it would take a book to describe the uses of each one, so during this talk I am confining myself to three filters only. The K-2 I just mentioned can be used on such films as Verichrome, Plenachrome and others known as Panchromatic type films. If you want real dark skies or want to make blue

CLOSE-UP OF HIBISCUS "VELVET TOUCH" WITH SOME FOLIAGE. BLACK CARDBOARD USED AS BACKGROUND. PICTURE MADE WITH EXTENSION TUBE ON CAMERA AND APPROXIMATELY 22 INCHES DISTANCE FROM CENTER OF FLOWER TO CAMERA LENS.

JAVA PLUMS IN PLASTIC DISH. CHINESE TYPE STRAW MAT AS BACKGROUND.
colors to come out dark then you would use a Red Filter . . . known as the Wratten F or Wratten A filters. The third filter I have in mind is for a real special purpose and is known as a Polarizing filter, and with it you can deepen colors, or cut out glare and there are many other special uses which you will find described in a pamphlet that comes with each filter.

If you contemplate making many pictures for reproduction or advertising, then I would advise using a camera costing $60.00 or more, of the 35 millimeter type, or the type known as a double lens reflex. With either of these two types you have a double purpose camera . . . that is you can make black and white photos or use color film for slides in natural color. The 35 mm camera comes with what is known as a Range finder that makes it possible to get the correct focus or the correct distance. It also has a View finder for composing the picture. You also get several shutter speeds, and as a rule the lens is fast enough to take pictures under many adverse light conditions. With the double lens reflex you see your subject on a ground glass, and this also allows you to get the subject in focus.

When you get into the higher brackets you will find another type of 35 mm camera known as the single lens reflex and with this you can see your subject right side up on a special glass with added brilliancy. This is the most practical for serious work, and especially any that requires great magnification. This type of camera has many accessories such as extension tubes that allow you to get as close as one and one-half inches from the subject up to the normal focal length of the lens which starts at 3 feet on most cameras with a 50 mm lens. This is the type of camera that I use for the majority of my slides and black and white pictures. My camera is the famous Swiss camera known as the ALPA single lens reflex with a very fast lens rated at F 1.8 and equipped with a shutter called a focal plane shutter with speeds up to one thousandth of a second. I also use a larger reflex camera for some types of pictures requiring great magnification. This includes the Graflex and a bellows type camera such as the Speed Graphic.

There is only one thing I want to add to this brief summary on the different kinds of cameras. If you have a 35 mm camera without the reflex principle, there is a gadget known as the CAL-CAM that fastens to a tripod and to the camera. The Cal-Cam has two extensions with a framing device at the end. With this arrangement you can see what you will actually get in the picture when using close-up supplementary lenses. This device costs less than $10.00 and almost a “must” for non-reflex type 35 mm cameras. (CAL-CAM CO. 1564 N. Grand Oaks Ave. Pasadena, 7, California.)

The subject of equipment would take hours, and as I have only 25 minutes, I will have to give you a brief summary.

Now for the actual procedure towards better pictures . . . I will bring in a few accessories that you will need with any type cameras that I have mentioned. The photos mounted on boards will illustrate the accessories mentioned, and I will also use a projector to show the same subjects in color. I might add that all the pictures were originally made in color slides and from these slides
I made black and white negatives in my laboratory. If you have one of the medium or better cameras you will need a light meter such as the Weston or General Electric meter to measure the light for accurate exposure. Of course the matter of Composition is very important.

I will not try to take up the rules of composition... for you will find many books on this subject... But there are two or three rules that apply in almost all cases... First... On pictures with distance effect... the horizon line of your picture should be one third from the bottom of the picture or one third from the top... Roads in a picture lend an interesting effect if they lead in from the right hand corner or the left hand corner. On close-ups of flowers, fruits, etc... the center of interest should sort of rest on this imaginary horizon line... that is about one third the distance from the bottom of picture... You can center the subject... but the rule still applies otherwise... For example see the picture of six papaya-fruit. This picture, pictures... or close-ups of fruit, seeds or leaves... are the backgrounds which are just simple colored cardboards such as used by show-card painters and found in almost any art supply store. Bristol boards, celotex, masonite painted with different colors, window curtains and even oil cloth... are a few useful background materials I use from time to time... By using a colored card on close-up subjects you eliminate the cluttered up effect of the background... and it puts the accent on your subject... with the whole effect having a sharp outline... Many artists in engraving shops paint out backgrounds to get this effect... but it is more costly... and not as clean... Other props include mats or matting for oriental subjects such as the Lychee fruit... Camellias... Persimmons, etc... Oriental vases, dishes, etc. can be used to add atmosphere... See... Picture of Lychee fruit.

Of course many times you see a picture that you want and don't have any prop or background handy... So... here are a few suggestions... Move around the subject looking thru the camera... and see if you can include the sky as a background. Tall growing plants or flowers often have a limb with flowers or fruit that can be isolated... and with the correct composition you get a well composed and effective picture... If not too close you can include cloud formations in the background.

When taking pictures with color film such as Kodachrome a blue cardboard (such as I have here) looks like it was made against the sky... that is if no shadows are allowed to fall on the card from any angle. When using cardboard or other colored backgrounds... you add interest to the picture by having the

Fruit and leaves of shrub OCHROSIA. Illustrating diagonal composition... Also blotter as background.

by the way, was made on the spot using the front steps of a home... and a black cardboard placed in background. The group JAVA PLUMS in a dish also follow this rule of composition. And the next picture... that of the fruit of the OCHROSIA with the stem and leaves... illustrates another rule of composition... that is the one third horizon line... and the diagonal line of the stem and leaves. If you will study many pictures in books and magazines you will observe many composition variations.

Now on the matter of props... I might state that the most used items I use for flower

Papaya fruit on doorstep. Illustrating how to use available material on the spot. Black cardboard used as background. One third horizon line composition rule applied.
pattern of a branch with leaves show on the background to the side of the subject... or above the subject...

Other things can be used for interesting shadow patterns... such as lattice or screens... round or square subjects casting a shadow on the background can be used effectively for many subjects...

Many of the colorful plastic dishes found in our dime stores can be used for fruits, leaves or flowers... One item I have found useful is a set of dishes shown in the photos and slides of the tamarind fruit and the Bixa orellana or lipstick tree... These dishes are red, green or clear and measure 4 1/2 x 6... and large blotters are used underneath... The set-up of dishes and fruit are tilted by placing an object such as a book underneath... and the camera is pointed down at a slight angle... You can change the color of the dishes by placing one upon another... Then if you have a green fruit... you can use a red dish... or vice versa... or you can use a clear color dish on a colored blotters... There are many color effects obtainable by just experimenting with different colored blotters, cardboards... or colored dishes... and props...

**BREEDING GLADIOlus FOR DISEASE RESISTANCE**

**Robert O. Magie**

*Florida Agricultural Experiment Stations*

*Gulf Coast Experiment Station*

*Bradenton*

Fungus diseases are estimated to have destroyed in one year about two million dollars' worth of gladiolus flowers and corms in Florida. The Fusarium disease of corms, caused by *F. oxysporum f. gladioli* Sny. and Han., accounted for over three-quarters of this loss. The remainder of this loss was due to diseases of the leaf and flower. These diseases caused by *Curvularia lunata* (Wak.) Boed., *Botrytis gladiolorum* Timm., and *Stemphylium* spp., usually can be controlled by spraying the plants with zineb or nabam. The cost of controlling diseases of the leaves and flowers and the poor control of Fusarium corm rot by chemical treatment make it highly desirable to develop disease-resistant varieties. The problem is to develop resistant varieties adaptable to winter production of cut flowers and tolerant to long-distance shipping.

In many cases a cut-flower grower must make a choice between a good commercial variety which is susceptible to Fusarium corm rot and one that is resistant but not as suitable for the market. In too many instances the choice is made in favor of varieties whose flowers are inferior in quality but which appear to be more profitable to grow because of disease resistance.

The unsatisfactory control of the Fusarium disease by chemical treatment of corms has been due to the fact that the fungus is carried in the vascular tissue of the corms and is transferred to the new corm crop in spite of treatment. There is no known method of detecting latent infections of corms and cormels. Until a chemotherapeutic agent is found which will kill the fungus without injuring the corm, breeding for disease resistance will continue to be the most promising method of control.

Next to Fusarium in importance is the Botrytis disease which attacks flowers, corms, and leaves in cool moist weather. The flowers of all varieties appear to be susceptible. However, the leaves of a few varieties show good resistance. This disease is controlled satisfactorily by frequent spraying but, during prolonged periods of rainy weather, adequate control by spraying may be impractical. Botrytis is especially serious because the fungus may spread from a few infected flowers causing an entire hamper of spikes to rot in transit and storage.

The other two major fungus diseases of gladiolus in Florida are Stemphylium leaf spot, and Curvularia spot of leaves and flowers. Some varieties are highly resistant to either or both of these and no difficulty is experienced ordinarily in breeding varieties with good resistance to them.

The Fusarium and Botrytis diseases are so destructive and difficult to control that one of the most important research problems is to develop resistant varieties. During the past six years, hundreds of varieties have been tested for disease resistance. Results indicate that none are immune to either disease. However, it is not expected that a lack of immunity