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Blasting. Part 2. Explosives on the farm

Cover Page Footnote
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EXPLOSIVES AND THE FARMER

PART II—EXPLOSIVES ON THE FARM

By G. A. GREAVES, B.Sc., A.R.A.C.I., Explosives Branch, Mines Department

EXPLOSIVES will function with maximum reliability and efficiency only when they are carefully stored under cool, dry conditions so as to avoid deterioration. When preparing charges the user should follow a correct procedure and use the proper tools. Always treat explosives with respect and remember they are made to explode. When they hit they hit hard.

HINTS ON SAFE-KEEPING

No storage license is required by a farmer for quantities less than 50 lb. or one case of gelignite, but he is responsible for keeping the explosive in a safe and proper manner. Purchases will usually be made from the nearest licensed store and should be limited to the amount required for the job in hand. It is far better to have fresh supplies than to rely on material which has been kept for months and which may be in doubtful condition. When explosives have to be kept on a farm there is no excuse for carelessness. Too frequently gelignite is left in an open box out in a shed where it may be forgotten and will soon deteriorate. Special care is necessary with detonators since they are small and seem to have some peculiar attraction for children who may insert nails or sticks into the open end. It is extremely dangerous to do this. The composition is sensitive to friction and explosion of a detonator when held in the hand causes serious injury which usually results in loss of one or more fingers and possibly the loss of an eye. Any loose detonators should be kept in a small box or tin with a clear label. This in turn should be enclosed in a small wooden receptacle box which is also clearly marked and kept in a safe and secure place. Detonators may also be kept in either a locked office drawer or a fireproof safe.

When plugs of explosive such as gelignite are kept and used on the farm it is essential that a wooden receptacle box be provided. The size will depend on the quantity of explosive but the box should have a close fitting lid, carrying handles and a padlock. A coat of white paint and the word “EXPLOSIVES” in red will ensure that the contents are known and treated with respect. Suitable receptacles and carrying boxes are frequently available from Army disposal stocks. Loose plugs of explosive should be placed in a tight-lidded tin or in a plastic bag within the box if they are to be kept for any length of time. This excludes moisture and prevents softening and deterioration. Detonators should not be carried in the same box with explosives unless separated from them by a thick partition to prevent possible communication in the event of an accident to the detonators.

It is a mistake to hide explosives in unusual places for security. Some unfortunate accidents have occurred for this reason. There was an instance some years ago in this State when a small quantity of gelignite was stowed in the oven of an old wood stove which had been removed from a house. In due course some other person put the stove back into the house.
Procedure for capping fuse and making up priming charge

CLITTING THE FUSE
TAKING OUT THE DETONATOR
INSERTING THE FUSE INTO THE DETONATOR
CRIMPING THE DETONATOR
MAKING HOLE IN TOP OF CARTRIDGE
INSERTING FUSE AND DETONATOR
FOLDING CARTRIDGE PAPER ROUND FUSE
TYING CARTRIDGE PAPER ROUND FUSE
and lit a fire in it. When the oven became heated, a violent explosion occurred and three women were fatally injured. There may be some tendency on farms to use chaff or wheat bags for wrapping or carrying explosives. This can be dangerous since the bag affords little protection from moisture in the air. If the explosive is left to become wet or soggy the bag becomes impregnated with ammonium nitrate and is then a dangerous fire hazard since the fibre may then ignite spontaneously.

**CAPPING A FUSE**

This is the fitting of fuse to a detonator and the correct procedure is shown in the photographs. The tool used is called "crimping pliers" or "detonator nippers." They can be purchased for a few shillings through the licensed store and successful capping or crimping can only be achieved by having the proper tool made especially for the purpose. The tool also incorporates a cutter for safety fuse and a tapered end suitable for making the hole in a plug of explosive.

Length of fuse will depend on the size of the charge but should never be less than three feet. Fuse burns steadily at 90 seconds per yard and this gives ample time to walk to shelter when firing a small charge. Always cut the fuse squarely across and remove about half an inch from the free end as a precaution so as to expose fresh, dry powder. Remove a detonator from the tin and tap it gently on the thumb or into the palm of the hand to remove loose sawdust. Hold it to the light to make sure the inside is clear. Insert the fuse gently as far as it will go without using any force or screwing action, then crimp firmly and evenly with the crimping pliers.

**MARKING THE PRIMER**

This should be done when all else is ready for the blast. Never fit up a primer and then carry it around or proceed with other work. Do everything else first and then prepare the primer. Open the paper wrapping at the end of the plug of gelignite and make a hole to take the detonator. Wooden skewer sticks are supplied in explosive cases for this purpose or the tapered end of the crimping pliers may be used. Insert the detonator gently into the hole and fold the paper wrapping round the fuse. A final tie-up with string is a useful precaution against the detonator coming out and causing a misfire. A word of caution here:—if the explosive seems hard, do not attempt to force the detonator into it; enlarge the hole until it fits easily. Some grades of explosives are harder than others. Gelignite is generally soft but may harden when stored in a hot place. If this has occurred it is best to use fresh soft material for the primer and avoid any accident which might be caused by forcing a detonator into hard material. In any case always make a hole first with the wooden skewer.

**LOADING AND FIRING**

When several plugs are used in one hole they should be inserted one at a time and tamped firmly in contact with one another by means of a wooden rod. The use of steel or any hard metal is against Mines Regulations and is considered a dangerous practice. Finally the primer is inserted and the hole filled with damp earth or loam which is again tamped firmly with the wooden rod. Fuse can be fired with a match if the end is split open so as to expose part of the powder filling. An effective method is to hold the match-head in contact with the powder and
ignite it by striking the box against the match-head. When several fuses have to be started at the same time it is best to use a two minute fuse igniter. These are like a firework. They burn with a short fierce flame for two minutes and will light a series of fuses with certainty. By noting the second hand on a watch when the fuse is fired, one can always know just when the charge will fire by allowing 90 seconds for each yard of fuse.

**ELECTRIC FIRING**

No. 6 detonators can also be obtained for electric firing. They are made of copper instead of aluminium and fitted with copper wires varying from 54 in. to 120 in. long as required for various purposes. A low voltage current fires a match-head inside the detonator and this in turn fires the exploding composition. In practice several detonators can be connected in series and joined by a long length of strong flexible cable to a special blasting machine which supplies the necessary electrical impulse for firing. This method is widely used in quarry blasting where a whole rock face can be blown down at one press of the button on a blasting machine. As far as the farmer is concerned, electric firing is not recommended unless one is prepared to spend money on the proper equipment. Ordinary electric lighting flex is sometimes used for the connecting cable; it is not strong enough to withstand rough conditions and fails to fire because of a break somewhere in the wire. Car batteries may be effective for firing under some conditions but with added resistance of long connections the voltage may not be quite high enough, especially if several detonators are wired together.

Electric blasting requires an adequate blasting machine of approved design and a large coil of strong connecting cable. These are available from the explosives agents who will also provide further details of the manner of connecting and firing.

**DETONATING FUSE**

This special fuse has a wide application in quarry blasting but is not normally used for small works. It consists of a white or yellow plastic tube, about the same size as safety fuse, filled with a white powder explosive which detonates at extremely high velocity, higher than the reaction velocity of gelignite. It cannot be ignited with a match but requires the shock of a No. 6 detonator. The detonator is tied or taped to the fuse and fired by safety fuse. In Australia the name of Nobel’s detonating fuse is “Cordtex”; it explodes with a sharp report and burns at the rate of nearly 4 miles per second. Cordtex has been found useful for ringbarking trees. It is simply coiled tightly around the tree trunk and ignited by fuse and detonator. The sharp explosion is sufficient to strip the bark without damaging the wood.

**APPLICATIONS TO AGRICULTURE**

**LOG SPLITTING**

For logs up to 3 feet in diameter the “Log-Splitting Gun” is still widely used and accounts for most of our sales of blasting powder in some districts. The powder charge is ignited directly by safety fuse and it must be remembered that blasting powder is sensitive to flame or spark. Always keep it in a well covered tin canister and avoid any temptation to smoke while carrying or using blasting powder. Although this rule is applied with all explosives it is especially important with any form of gunpowder. For larger logs it may be necessary to bore holes in the sides and charge with gelignite. Experience is necessary to estimate the size and placing of charges but generally only a few ounces of explosive are required for each hole.

**BLASTING OF STUMPS OR TREES**

Considerable experience and judgment are required to obtain the best results with a minimum of labour and explosive. Factors to be considered are the type of root system and whether it be green or dry. The nature of the soil is also important. Space does not permit of great detail but the diagrams are likely to be more useful than a lengthy description of the method. The dotted lines shown, represent the extent of blast from a charge placed underground. Generally the diameter at the top is a little less than twice the depth of the hole. The charge should be deep enough for the cone to include all the stump and part of the
Placing of charge in a tap-root. Hole bored with a 1½ inch. auger

main roots. Holes are drilled with an earth auger of 1½ or 2 in. size and in sandy or crumbly soil the addition of water may help to prevent the holes falling in. Gelignite can be used successfully but a more heaving effect is obtained using Quarry Monobel with a gelignite primer. Fuse firing is generally used. Several charges in a small area can be fixed at the same time using fuses of adequate length and a two minute fuse igniter to light them all promptly. Electric firing ensures that all charges explode at the same time but should only be used when at least 100 yards of strong cable and an approved exploder are available.

In placing the charge, a wooden tampering rod must be used to press each cartridge in place. After placing the primer

the hole must be filled with moist soil free from stones and finally tamped firmly. No explosive exerts its maximum effect unless it is well-confined. There are several methods of dealing with large tap-roots as shown in the accompanying diagrams. When it is desired to concentrate a larger charge at the bottom of the hole as shown in some of the drawings, this is done by "bulling" the hole. A small charge is first fired at the bottom to enlarge it and form a cavity into which several plugs can then be packed. After "bulling" a hole it is most important to allow time for cooling before placing the main charge. Pouring water into the hole will assist cooling but it is dangerous to pack a charge into a hot hole.

Location of charge for an evenly rooted stump

The important principle of blasting stumps is that the work can be done effectively and economically by placing small charges in the right places. Too frequently there is a mistaken idea that it is necessary to dig a large hole under the stump and blast it to the heavens with one large charge. This is both dangerous and expensive.

BREAKING BOULDERS

Rock drills are not generally found on farms and boulders are broken either by "mud capping" or by "snakeholing." The diagrams show what is meant by these terms. Mudcapping is the same as plaster shooting and a high strength explosive is necessary. Gelignite is satisfactory but better results are obtained with Gelatine Dynamite or Plastergel. A charge of 8-16 oz. per cubic yard of rock is placed in close contact with the rock and covered.
Breaking a boulder by plaster-shooting or mud-capping with stiff damp clay to exclude all air holes. When fired, the effect is that of a sharp hammer blow on the rock. The same procedure is used in the foundry or scrap-yard for breaking large steel castings for remelting.

Lifting and breaking a partly buried boulder by “snake-holing”

**TREE PLANTING**

Explosives not only dig the hole but also loosen up the surrounding soil. Blasting should be done only when the soil is dry and satisfactory results can be obtained by a charge of 4 to 8 oz. at a depth of 3 feet.

**SUB-SOILING**

This is a useful means of loosening up soils which are hard and impervious. Small underground explosions are effective to a much greater depth than is normally obtained by ploughing. Holes are bored to 2 or 3 feet at intervals of from 10 to 20 feet apart and charges of about one plug are placed in each hole. The holes are filled and tamped firmly with earth and fired by fuse. Best results are obtained when the ground is dry.

**GENERAL APPLICATIONS**

Explosives have certain general and obvious uses in developing a farm. These include dam sinking, well sinking and excavation of ditches or drains. The ring-barking of trees with Cordtex has already been mentioned and the placing of fence posts in hard ground can often be facilitated by small blasting charges.

**DESTRUCTION OF EXPLOSIVES**

Unwanted or deteriorated explosives are best destroyed since there is no purpose in continuing to keep material which is potentially dangerous and is frequently forgotten by the owner. The question arises how this should be done. To dispose of a few odd plugs the obvious way is to tie them together and fire them with fuse and detonator in a hole. Detonators can be fired together from a fuse crimped to one cap but no more than 100 should be so fired together and always at least 12 inches below the surface. Safety fuse can be burned safely on an open fire.

If the owner has no extent of private property on which to fire explosives he can deliver them to a Police Station or call a Mines Inspector or the Inspector of Explosives for assistance. In the metropolitan area the Explosives Branch will collect and destroy any unwanted material or it can be taken to a Police Station. Explosives must never be thrown into any dam, creek, lake or river and must not be thrown away or discarded with other rubbish.

Gelignite and similar nitro-compound explosives are destroyed by burning but this is a task for an experienced person. It is commonly thought that gelignite will burn safely but there is always a danger of detonation particularly if the material is too closely packed. No person should attempt to burn these explosives unless instructed by a Mines or Explosives Inspector.

The foregoing comments have been necessarily brief and the writer is only too well aware that the subject has been covered in a very sketchy manner. For those who wish to learn more about the nature and uses of explosives the books listed below are recommended. All are available at reasonable cost through bookshops in Perth.
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BIBLIOGRAPHY


TOXIC PLANTS IN HORTICULTURE

By R. D. ROYCE, Officer in Charge, Botany Branch

During the past few months several talks presented on this session have dealt with toxic plants which are commonly grown in gardens. Oleander, one of the most poisonous plants known, Cape Lilac which has caused sickness amongst young children, Boobyalla and many other plants have been discussed in detail.

A number of enquiries have been received at the Department of Agriculture regarding these trees, particularly with reference to the advisability of retaining or growing them in gardens. The mere fact that they contain a toxic principle is to many people, far more important than the other obvious advantages that the plants may have to offer. For instance the three species mentioned are all hardy drought resistant plants which are amongst the best that can be grown under the hardest conditions, and because of this and despite their toxic nature, they will most certainly continue to be widely used. The only class of plant which could reasonably be banned from gardens are those which produce severe allergies, particularly the species of Rhus which can cause intense dermatitis without direct contact with the victim.

The mere statement that a plant is toxic, does not necessarily mean that it is dangerous to human beings, or that it should be destroyed. The statement is frequently made with respect to the grazing of the plants by animals, and the toxicity of leaf material is unlikely to cause any trouble to humans. Only if the fruit or sap is poisonous, or the plant is capable of causing mechanical injury is it of any real significance.

The principal consideration is how the plants should be handled and where they should be grown. The proper planning of a garden usually involves a considerable amount of thought, and this is particularly important when dealing with plants which produce poisonous fruits. Shrubs and trees of this type should be planted in the centre of garden beds and surrounded by other shrubs, or where the garden is in front of a wall or fence line, they should be planted at the back.

If used as specimen trees and grown in an open area they should be carefully pruned and shaped to keep the fruit out of reach of children. In their early stages of growth before pruning is possible, the fruit should be removed manually before it matures. The shrubs, as for example Lantana, should not be used as hedges or border plants where children would have ready access to the fruit.

Plants which produce irritant sap also need careful handling, and the use of gloves can usually provide the necessary protection. Poinsettia, Snow-on-the-Mountain and similar plants frequently cause skin trouble in susceptible people, while the Purple Trumpet Flower is reputed to have caused the blindness of a gardener who pruned the plant. Under normal gardening practice, however, adequate precautions can be taken against this type of plant.

The third type includes such plants as Wigandia which has an irritant hairy indumentum, and the Queensland Pyramid Tree. This species produces a pod in which the seeds are protected by masses of fine rigid fibres and these are capable of causing skin irritation, particularly in hot weather. Spiny plants such as Honey Locust, False Acacia and Duranta are perhaps in this category too, and all of them can be planted in the same positions as those trees which produce poisonous fruits.

It is quite obvious then that the mere fact that a plant is known to be harmful need not necessarily debar it from use in horticultural practice. Many plants other than those mentioned here are valuable plants, although poisonous, and they will continue to be grown without trouble, provided due care is exercised in their use.

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