THE EFFECT OF SEASON OF SOWING, STORAGE TREATMENT, AND HULLING ON GERMINATION AND GROWTH OF BLACK WALNUT SEED

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The demand for black walnut seedlings in recent years has often exceeded the supply, and lack of seed is the reason generally given for the limited seedling production. This problem, and the fact that nurserymen are becoming more selective in choosing walnut seed sources, make it increasingly important to find out how to augment seedling yield from a limited amount of seed.

The research reported here shows that fall sown seed produces more seedlings at most Central States nurseries than spring sown seed. And because the fall sown seed germinated sooner, the seedlings produced were usually larger than those produced in spring sown beds. Hulling the nuts did not affect seedling yield, but hulling reduced volume by about two-thirds, thus making it easier to stratify and store the seed.

Methods

Black walnut seed was collected from a stand near Orleans, Ind., in mid-October 1965. A cracking test showed that more than 90 percent of the seeds were sound. The seeds were thoroughly mixed, then 1200 unhulled nuts and 1200 handhulled nuts were bagged for each of four nurseries: the Vallonia and Jasper-Pulaski in Indiana, the Mason in Illinois, and the George O. White in Missouri. At each nursery, four replications of the six treatments listed below were sown in a randomized block design:

1. Fall sown unhulled nuts.
2. Fall sown hulled nuts.
3. Spring sown unhulled nuts stratified overwinter in outside pits.[1]
4. Spring sown hulled nuts stratified overwinter in outside pits.
5. Spring sown unhulled nuts stratified overwinter in 37° F. cold storage.[2]
6. Spring sown hulled nuts stratified overwinter in 37° F. cold storage.

Results and Discussion

For all nurseries combined, the average germination of fall sown seed was one and a half to two times as good as for spring sown seed (table 1). Fall sown seed germinated sooner and more completely than the spring sown seed. The seedlings from fall sown seed also were generally taller than seedlings from the spring sown seed, but there were no practical or consistent differences in the diameter of the seedlings.

An exception to the better germination of fall sown seed was at the Mason nursery where spring sown seed produced about a third more seedlings than fall sown seed. This exception is difficult to explain. Cold storage temperatures were about 4° F. lower at the Mason nursery than at the other nurseries, and may have helped maintain seed viability. Also, the best season for sowing walnut seed may be determined somewhat by local weather conditions.

1 These nuts were placed in burlap bags.
2 These nuts were sealed in polyethylene bags. At the Mason Nursery cold storage temperatures varied from 32° to 34° F.

TABLE 1.—*Average germination and growth of black walnut seedlings at four Central States nurseries as affected by season of sowing, storage treatment, and hulling*

Nursery	Fall sown		Spring sown			
			Pit stratified		Cold storage	
	Hulled	Unhulled	Hulled	Unhulled	Hulled	Unhulled
	Germination (percent)					
Jasper-Pulaski	46	50	48	20	24	31
Mason	40	40	51	43	52	54
George O. White	64	62	7	10	10	11
Vallonia	50	43	21	6	1	1
Vallonia (1968)	50	55	32	35	25	8
Average	50	50	32	23	22	21
	Height (inches)					
Jasper-Pulaski	13	13	12	12	12	12
Mason	16	16	16	15	15	16
George O. White	17	18	14	14	16	13
Vallonia	21	18	13	11	7	5
Vallonia (1968)	23	19	17	16	18	14
Average	18	17	14	14	14	12
	Diameter (1/32 inches)					
Jasper-Pulaski	10	10	10	10	9	10
Mason	13	13	13	12	12	12
George O. White	11	12	12	14	13	12
Vallonia	12	11	10	10	8	6
Vallonia (1968)	12	11	11	12	11	11
Average	12	11	11	12	11	10

Hulling seed sown in the fall had no appreciable effect on germination or growth of the seedlings at any of the nurseries. At a couple of the nurseries, however, hulling improved germination of spring sown seed, but these nurseries obtained much better results with fall sown seed. Nurserymen have been reluctant to sow unhulled walnuts because of the potentially toxic juglone in the husk. However, unhulled walnuts have been sown at the George 0. White nursery for several years with no apparent toxic effects to the current walnut seedling crop or any apparent buildup of husks.[3] The effects of walnut husks on other seedling'species, however, has not yet been evaluated. From the convenience standpoint, hulling of seed to be stored or stratified is advantageous because it reduces the volume by about two-thirds and also results in cleaner seed.

[3]Personal communication from Delbert Mugford, Nurseryman, George 0. White Nursery, 1970.

Pit stratified seed germinated better than sees from cold storage at two of the four nurseries. At the Mason and George 0. White nurseries, there were no significant differences in germination of seed stratified in pits or cold storage. The better germination of pit stratified seed as compared to cold stored seed in two of the. nurseries agrees with results from a previous study on storage methods for walnut seed.[4]

In conclusion, black walnut seed should be sown in the fall in most Central States' nurseries for greatest germination and larger seedlings. There was no particular advantage in removing the husks of seed to be sown in the fall. If the seed is to be stored overwinter for spring sowing, then hulling is advantageous because it reduces the storage space required. And for best results in storing seed; use pit stratification rather than cold storage.

4 Williams, R. D. 1970. Walnut seed can be stored. Paper prepared for publication in *Tree Planters'* Notes.